

## STUDIES IN AMERICAN TETTIGONIIDAE (ORTHOPTERA)<sup>1</sup>

### I and II

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The present general title is selected to cover a somewhat connected series of systematic and geographic papers on the Tettigoniidae of the Americas. The authors have in hand for study very extensive collections of the group and in the determination of these series it has been, and in the future also will be, necessary to consult the other important collections of the order. In a number of cases it has proved necessary to analyze and even completely revise genera to properly locate our series, and it is our intention to bring out as parts under the present general title the results of these studies.

Unless otherwise specified, the material listed in these papers as having been collected by the authors, jointly or individually, is to be found in the Hebard Collection and that of the Academy of Natural Sciences of Philadelphia. The abbreviations used for the sources of other material are in general use and clearly intelligible. In the case of smaller collections and institutions the source has been given at sufficient length to be clear to all.

The color terms used in the descriptions are based on Ridgway's standards (Color Standards and Color Nomenclature, 1912).

### I

#### A SYNOPSIS OF THE SPECIES OF THE GENUS SCUDDERIA

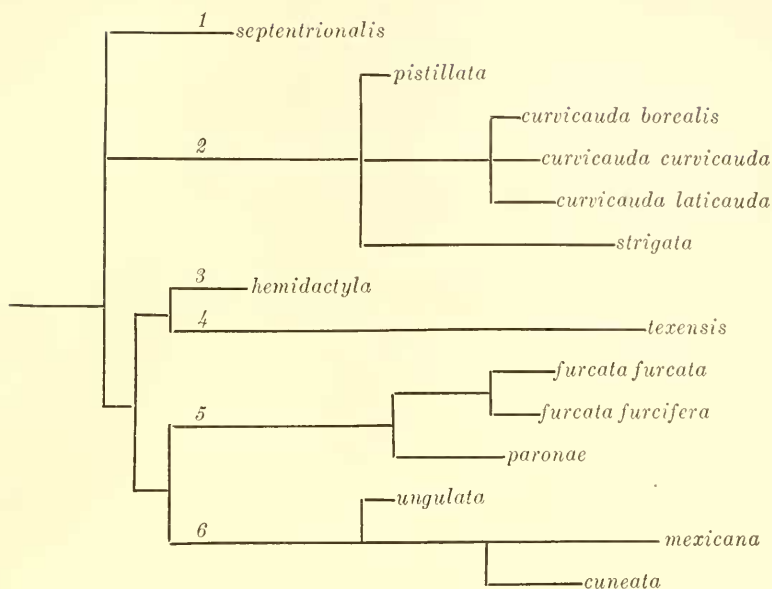
It has recently been necessary for the authors to record certain species of the present genus, and it was found impossible to do this correctly without study of all of the material before us. The present paper could be considered monographic, were it possible to include more complete data on the distribution of certain of

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the very scarce forms, and on material from certain areas in the wide distribution of other well known species.

In 1898, Scudder revised the present genus, describing several new species and correcting certain mistakes in the nomenclature at that time in general use. In a number of places, however, his treatment is unsatisfactory, owing partly to the fact that the importance of geographic races was not appreciated by him. Other errors are attributable to that author's lack of knowledge of certain species; these included his misconception of *S. paronae* and his retention in the genus of the species *forcipata*, which latter insect is a member of the allied but very distinct genus *Chloroscirtus*.

The present work is based mainly upon the material in the Philadelphia collections and examination of the series in the Museum of Comparative Zoology, the Morse Collection and the United States National Museum. We are deeply indebted to the following gentlemen who have assisted us greatly in various ways during the preparation of the present paper: Prof. A. P. Morse, Mr. A. N. Caudell, Dr. Samuel Henshaw, Dr. J. Chester Bradley, Mr. William T. Davis and Dr. F. E. Lutz. The material before us includes all of the known species of the genus and has enabled us to correct a number of errors and ascertain more clearly the proper grouping of the species. This latter task is particularly difficult owing to the numerous lines of development found in the genus, as shown by the species which divide into numerous groups, each containing but very few forms. These groups are six in number: the first of these contains the primitive *septentrionalis*; the second, *pistillata*, the three races of *curvicauda* and the very aberrant *strigata*; the third, the anomalous and apparently rather primitive *hemidactyla*; the fourth, the specialized *texensis*; the fifth, the two races of *furcata* and *paronae* and the sixth *ungulata*, *cuneata* and *mexicana*. The correlation of these forms may be graphically demonstrated as follows:—



In some respects members of the different groups show a certain similarity to each other. Thus *septentrionalis* and *pistillata* both have coriaceous tegmina with heavier veinlets; all of the other species have the tegmina glossy, this being particularly marked in *hemidactyla*, due partially to the tegminal veinlets being reduced in this species to the minimum size found in the genus. A broadly and evenly arcuate ovipositor is found in *septentrionalis*, *hemidactyla* and *ungulata*, and the greatest bend in that organ is found in the most highly specialized species, *texensis*, *strigata* and *mexicana*. The male supra-anal plate is not strongly produced and compressed in *septentrionalis* and *hemidactyla* only. The tegmina are very broad in *pistillata*, broad in *curvicauda* and its races, *septentrionalis* and *ungulata*, and narrow to varying degrees in the other species, this attenuation decided in *texensis* and *mexicana* but reaching an extreme condition in *strigata*.

The species of the present genus have the genicular lobes of all the femora bispinose; the ventro-cephalic margins of the cephalic femora often bear a very few small spines or denticulations, the ventro-caudal margins of the same one or two, but these are fre-

quently absent, the ventral margins of the median femora are always smooth, those of the caudal femora usually bear a few small spines but in *hemidactyla* these latter margins are distinctive, bearing instead small teeth.

In the present paper the body length measurements are taken from the vertex to the apex of the subgenital plate in both sexes. The ovipositor length is taken from the ventral apex of the basal plica to the apex of the ovipositor.

We have had before us the types of *curvicauda borealis*, *strigata*, *hemidactyla*, *furcata furcifera*, *ungulata* and *cuneata*; all of which, excepting *cuneata*, are in the Philadelphia collections. We have corrected all of the erroneous determinations for the present genus which we have made in the past and also the evident mistakes which have been made by other authors, where it has been possible for us to do so. Under each species the synonymy alone is given, except in the case of *curvicauda laticauda*, where all previous correct references are given, and in *furcata furcifera* and *paronae*, where it has been thought best to give all previous references which apply to these previously little known species. In the specific treatment here no description of previously described species are given, but an effort is made in every case to emphasize the most important characters of the species. We have not recorded here any material which has been previously correctly recorded. We have examined nearly 2000 specimens, while the number of individuals here listed is 1139.

#### KEY TO THE MALES OF THE GENUS SCUDDERIA

- A. Disto-dorsal abdominal segment subtriangular in outline with no median produced pistillate process. Subgenital plate not compressed distad. Cerci relatively long, not as strongly incurved distad with distal portion not, or but weakly, enlarged.
- B. Sides of disto-dorsal abdominal segment decidedly bisinuate, convex, and immediate apex truncate and subangulate excavate, segment elsewhere simple. Cerci gently arcuate throughout with apex not enlarged. Tegmina broad, coriaceous and dull, with heavy veinlets.  
**septentrionalis** (Serville)
- BB. Sides of disto-dorsal abdominal segment weakly concave distad and apex bifid, V-emarginate, segment elsewhere complex. Cerci gently arcuate to apex which suddenly bent inward and weakly swollen, though not nearly as much so as in the majority of the species of the genus. Tegmina narrow, rather glossy, with very weak veinlets.  
**hemidactyla** new species



- AA. Disto-dorsal abdominal segment with a median produced pistillate process. Subgenital plate compressed distad. Cerei relatively short, very strongly incurved distad with distal portion decidedly enlarged.
- B. Lateral angles of pronotum very broadly rounded. Tegmina extremely narrow, much narrower than length of pronotum. (Production of disto-dorsal abdominal segment furcate at apex, with lateral processes short and dorsal surface of same strongly declivent distad.)..... **strigata** Scudder
- BB. Lateral angles of pronotum not broadly rounded. Tegmina not very narrow, width greater than length of pronotum.
- C. Production of disto-dorsal abdominal segment truncate at apex with a slight median projection and with strongly compressed vertical lateral flanges, which completely embrace and generally extend beyond the sides of the subgenital plate when in natural position..... **texensis** Saussure and Pietet
- CC. Production of disto-dorsal abdominal segment furcate at apex with no median projection.
- D. Furcate portion of production of disto-dorsal abdominal segment lobate, these lobes bearing ventrad small vertical longitudinal flanges.
- E. Lobes of furcate portion of production of disto-dorsal abdominal segment distinctly tapering distad when seen from above. (Tegmina very broad and short.).. **pistillata** Brunner
- EE. Lobes of furcate portion of production of disto-dorsal abdominal segment subequal in width when seen from above.
- F. Size small, form compact. Tegmina rather broad and short.  
**curvicauda borealis** new subspecies
- FF. Size large, form less compact. Tegmina decidedly longer.
- G. Tegmina proportionately wider, lateral angles of pronotum decided..... **curvicauda curvicauda** (De Geer)
- GG. Tegmina proportionately narrower, lateral angles of pronotum less decided..... **curvicauda laticauda** Brunner
- DD. Furcate portion of production of disto-dorsal abdominal segment lobate, these lobes not bearing ventrad small vertical longitudinal flanges.
- E. Lobes of furcate portion of production of disto-dorsal abdominal segment not compressed laterad and not much longer than broad.
- F. Lobes of furcate portion of production of disto-dorsal abdominal segment decidedly swollen, broadest proximad when viewed from above..... **furcata furcata** Brunner
- FF. Lobes of furcate portion of production of disto-dorsal abdominal segment less decidedly swollen, broadest meso-proximad when viewed from above.
- G. Form less robust, limbs proportionately shorter. Antennae unicolorous..... **furcata furcifera** Scudder
- GG. Form more robust, limbs proportionately longer. Antennae annulate in typical material..... **paronae** Griffini



the difficulties involved in this case being fully discussed under the latter species.

Although Kirby<sup>2</sup> has referred *Locusta pallens* Fabricius,<sup>3</sup> to *Scudder*, we have omitted the species from the present treatment, as we are of the opinion that it does not belong to this genus.

The present genus is found from Nova Scotia to southern British Columbia, southward to the Isthmus of Panama, and in South America is known only from Trinidad (Caparo) and Dutch Guiana (Paramaribo). In the arid regions of the western United States and Mexico it is not to be found in the desert proper, but almost everywhere in the desert hills and mountains. The species of the genus are largely nocturnal, manifesting but little activity during the day. All but one of the species are normally uniform green in general coloration.

***Scudderia septentrionalis*** (Serville) (Pl. IX, fig. 14; pl. X, fig. 29; pl. XI, fig. 31.)

1839. *Phanoptera septentrionalis* Serville, Hist. Nat. Ins., Orthopt., p. 416. [North America.]

1894. *Scudderia truncata* Beutenmüller, Bull. Amer. Mus. Nat. Hist., vi, p. 252. [Vineland, New Jersey.]

Scudder in his revision of the *Scudderiae*,<sup>4</sup> has incorrectly supposed Heer's name *Phanoptera suturalis* to apply to the present species, and has sought to retain it for what from Heer's description, appeared to him to be a color form.

Heer described *Phanoptera suturalis* from New Georgia,<sup>5</sup> but in his treatment apparently mistook the locality for Georgia in the United States. The specimen was doubtless properly labelled "New Georgia," one of the Solomon Islands, since the description further shows the species to belong to the genus *Ducetia*, not agreeing at all with any species of *Scudderia*.

Lugger has given two excellent figures of the sexes of the present species from Minnesota unfortunately calling them *S. pistillata*,<sup>6</sup> he had doubtless both species before him. This record is the first which applies, at least in part, to this species from west of the Appalachians. Bruner's material shows that it was this

<sup>2</sup> Syn. Catal. Orth., ii, p. 446, (1906).

<sup>3</sup> Mant. Ins., i, p. 234, (1787).

<sup>4</sup> Proc. Amer. Acad. Arts and Sci., xxxiii, p. 286, (1898).

<sup>5</sup> Insektenfauna der Tertiargebilde von Oeningen und Radoboj, Abth. ii, p. 4, (1849).

<sup>6</sup> Orth. of Minn., p. 220, figs. 144, 145, (1898).

species from West Point, Nebraska, to which he has referred without a name.<sup>7</sup>

The present insect is readily separated in the male sex from all others of the genus by the triangular and simple disto-dorsal abdominal segment, and in the female by its small size and dull leaf-like tegmina accompanied by an extraordinarily long and gently curved ovipositor. The tegminal veinlets are heavier than in the other species of the genus excepting *S. pistillata*, to which insect the present species shows some approach in this respect as well as in its short heavy structure.

*Measurements (in millimeters)*

	♂ Marion, Massachusetts	♂ West Point, Nebraska
Length of body.....	18.4	18
Length of pronotum.....	4.7	4.7
Length of tegmen.....	28	25.2
Greatest width of tegmen.....	7	7.3
Length of caudal femur.....	19.4	18.1
Length of subgenital plate.....	5.4	5.7

The present insect has been found on the Atlantic coast from Norway, Maine, to Vineland, New Jersey, and has been taken as far west as West Point, Nebraska. The species is unquestionably one of the very scarcest forms of North American Orthoptera having a distribution so extensive.

*Specimens Examined.*—In addition to 3 males and 2 females previously recorded: 3; 3 males.

Marion, Massachusetts, VIII, 1906, (H.; undergrowth in woods), 1 ♂.

Lone Rock, Wisconsin, VII, 27, 1906, (J. D. Hood), 1 ♂, [U. S. N. M.].

West Point, Nebraska, VII, 27, 1887, (L. Bruner; in woods), 1 ♂, [Hebard Cln.].

**Scudderia pistillata** Brunner (Pl. IX, fig. 8; pl. X, fig. 24; pl. XI, fig. 30.)

1878. *Sc[udderia] pistillata* Brunner, Monogr. Phaner., p. 240. [New York; New Hampshire.]

Lugger unfortunately confused this species with *S. septentrionalis* and his figures which are credited to the present species belong in fact to that insect.<sup>8</sup> The male figure has again been used most unfortunately in Blatchley's treatment of *pistillata* in his Orthoptera of Indiana,<sup>9</sup> but there it is accompanied by Scud-

<sup>7</sup> Publ. Nebr. Acad. Sci., iii, p. 29, (1893).

<sup>8</sup> Orth. of Minn., p. 220, figs. 144, 145, (1898).

<sup>9</sup> Orth. of Indiana, p. 347, fig. 79, (1903).

der's larger figure of the male supra-anal plate of the present insect.

The present species is separable from all others of the genus by the much broader tegmina which are dull and very leaf-like, this partially due to the veinlets which are heavier than in any other species of the genus. This insect, though distinctive in this character also, has the production of the supra-anal plate of the male somewhat similar in general development to *S. curvicauda* and has been confused with that species by several of the early authors. The distal flanges of this production are produced ventrad in strongly compressed vertical flanges, deepest proximad at their arcuate bases which are situated at the bifurcation of the distal portion of the plate; *curvicauda* and its races have homologous flanges which are shorter, evenly arcuate in outline and occupy the proximal two-thirds of the distal flanges.

Females of *pistillata* bear a close general resemblance to females of *S. curvicauda borealis*, but in addition to the tegminal characters given above, the eyes of the present insect are very decidedly smaller and the caudal limbs very much shorter.

*Measurements (in millimeters) of extremes*

♂	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of subgenital plate
Great Cranberry Island, Maine.....	5.3-5.6	30.3-31.8	9.3-10.1	21.6-21.7	6.3-6.7
Saunders town, Rhode Island.....	6	34.3	11	24.1	6.7
Pequaming, Michigan.....	4.7-5.7	30.2-33.2	9.3-10.4	21-21.8	6-6.3
Staples, Minnesota.....	4.8-5.4	29-29.3	9-9.5	21.5-22.1	5.8-6
Black Hills, South Dakota	5.7	31.7	9	22.4	6.6
♀	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of ovipositor
Great Cranberry Island, Maine.....	4.9	25.4	8	20	6.8
Pequaming, Michigan.....	4.9-5.4	25.7-28	7.8-8	20.2-21.1	6.2-6.7
Staples, Minnesota.....	5.3	27.3	8.3	19.7	6.4
Black Hills, South Dakota	5.3	26	7.9	20.9	6.7
Livingston, Montana.....	5.4	27	8.1	20.3	7.2

The present insect, which is found in greatest numbers in the southern portions of the Canadian Zone, is usually met with in clusters of low bushes, such as wild rose, hazel and alder, in the open. Males are least active of the species of the genus, taking wing much less often when disturbed. The females are even more secretive than the males and usually prove very hard to find. We have never seen this sex take wing.

The distribution of this insect is known to extend from Halifax, Nova Scotia, southward to Chester in northern New Jersey,<sup>10</sup> and westward as far as Regina, Saskatchewan and Bozeman, Montana.

*Specimens Examined:* 46; 32 males, 13 females and 1 immature female.

Great Cranberry Island, Hancock County, Maine, VIII, 25, 1913, (H.; in wild rose tangle on edge of spruce forest), 4 ♂, 1 ♀.

Summit of Sargent Ridge, Mount Desert Island, Maine, VIII, 21, 1913, 850 feet, (H.; in huckleberry and other bushes on bare summit), 1 ♀ n.

Jaffrey, New Hampshire, IX, 4, 1896, (S. Henshaw), 1 ♂, [M. C. Z.].

Melrose Highlands, Massachusetts, VII, 21, 1908, (D. H. Clemons), 1 ♀, [U. S. N. M.].

Saunderstown, Rhode Island, IX, 3, 1913, (H.; open near shore in bayberry bushes), 1 ♂.

Weekapaug, Rhode Island, 1 ♀, [U. S. N. M.].

Honesdale, Wayne County, Pennsylvania, IX, 7, 1 ♂, [Pa. St. Dept. Zool.].

White Mills, Wayne County, Pennsylvania, VIII, 7 to 9, 1 ♀, [Bklyn. Inst. A. and S.].

Lopez, Sullivan County, Pennsylvania, VIII, 4 to 10, 1913, (W. Stone), 3 ♂, 1 ♀, [A. N. S. P.].

East Lansing, Michigan, (C. F. Baker), 1 ♂, [Morse Cln.].

Cranmoor, Wisconsin, VIII, 4 to IX, 16, 1909 and 1910, (C. W. Hooker), 6 ♂, [U. S. N. M.].

Lone Rock, Wisconsin, VIII, 9, 1906, (J. D. Hood), 1 ♂, [U. S. N. M.].

Beaver, Lake County, Minnesota, VIII, 11 to 12, 1912, (W. Stone), 1 ♀, [A. N. S. P.].

Waldo, Lake County, Minnesota, VIII, 1906, (W. Stone), 1 ♂, 2 ♀, [A. N. S. P.].

Wright, Carlton County, Minnesota, VII, 24, 1909, (H.; under pines in wild strawberry patch), 1 ♀.

Staples, Minnesota, VII, 24, 1909, (H.; in ditch overgrown with high weeds), 3 ♂, 3 ♀.

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<sup>10</sup> Saussure and Pictet record the present insect in the *Biologia Centrali-Americana* from Georgia. The species appears to be correctly determined, but the locality is certainly in error as the insect is not known to occur in the Appalachians south of northern Pennsylvania.



Mandan, North Dakota, VII, 25, 1909, (H.; along stream in rolling hills), 2 ♂.

Bismarek, North Dakota, VIII, 9, 1885, 1 ♂, [Hebard Cln.].

Englewood, Black Hills, South Dakota, IX, (D. A. Haggard), 2 ♂, 1 ♀, [Hebard Cln.].

Custer, Black Hills, South Dakota, 1 ♂, [Hebard Cln.].

Livingston, Montana, VII, 29, 1909, 4500 feet, (R. & H.; beaten from bushes near river), 1 ♀.

Bozeman, Montana, (Wilcox), 1 ♂, [U. S. N. M.].

Newcastle, Weston County, Wyoming, VII, 25, 1909, 4300 to 4400 feet, (R.; hills covered with grasses and low plants), 1 ♂.

Fort Fetterman, Wyoming, 1 ♂, [U. S. N. M.].

**Scudder** *curvicauda borealis* new subspecies (Pl. IX, fig. 9; Pl. X, fig. 27.)

1904. *Scudder* *curvicauda* E. M. Walker, Can. Ent., XXXVI, p. 326. (In part.) [Toronto, Tobermory and Severn River, Ontario.]

1910. *Scudder* *curvicauda* E. M. Walker, Can. Ent., XLII, p. 351. [Aweme, Manitoba.]

The records of *curvicauda* from "Boreal America" by F. Walker, Provancher, Thomas, Caulfield, Harvey and Knight and Scudder up to 1898, apply not to this race but to *S. pistillata*.

From the characters of the present geographic race a close resemblance to *S. pistillata* results, but that species may be readily separated by the smaller eyes, the much broader tegmina, shorter caudal limbs, much larger tympanal area of the male tegmina and excellent genital characters in that sex.

The measurements given below, when compared with those of *curvicauda curvicauda*, show the chief differences upon which this northern race is based.

*Type*—♀; Aweme, Manitoba. August 19, 1909. (N. Criddle; in tall dry vegetation.) [Hebard Collection.]

*Description of Type*.—Similar to *curvicauda curvicauda* but of smaller size and more compact structure. Pronotal disk broader in proportion to length with lateral angles somewhat more decided. Tegmina broader in proportion to length (width of same contained in length very slightly more than four times as an average), limbs proportionately shorter. Ovipositor very similar.

*Allotype*—♂; Aweme, Manitoba. August 22, 1909. (N. Criddle; on hillside.) [Hebard Collection.]

*Description of Allotype*.—Very similar in proportions to type. The produced portion of the supra-anal plate is similar to, but somewhat smaller than, that found in *curvicauda curvicauda*.



## Measurements (in millimeters)

	Aweme, Manitoba				West Point, Nebr.	Whitneyville, Maine	
	♀ Type	♀ ♀ Paratypes	♂ Allotype	♂ ♂ Paratypes	♀	♂	♀ ♀
Length of body.....	20	18-20	20.5	18.2-21.2	19	22.3	20-20.4
Length of pronotum	5.3	5.2-5.4	5.2	5-5.3	5.3	5.4	5.1-5.3
Caudal width of pronotum.....	3.8	3.7-3.8	3.4	3.3-3.6	3.6	3.6	3.7-3.8
Length of tegmen...	26.1	25.2-26.8	28	27.5-28.3	29.7	29	26.3-27
Greatest width of tegmen.....	6.4	6-6.4	6.8	6.5-7	6.5	6.9	6.3-6.5
Length of caudal femur.....	22.4	20.8-22.6	21.8	21.8-22.4	22.2	22.7	21.3-21.9
Length of ovipositor	7.4	7-7.4			7		7-7.4
Length of subgenital plate.....			6.9	6.8-6.9		6.9	

When our measurements are compared with those given by E. M. Walker for material from Ontario, we find that some of the specimens from the Severn River show an even greater accentuation of the characters of the present race, while those from Toronto show some tendency toward *curvicauda curvicauda*. All of the material before us from Maine is typical. The single specimen from West Point, Nebraska, though not typical, shows a much closer resemblance to the present race than to *curvicauda curvicauda*.

In the series before us the decided lateral angles of the pronotum are in most cases weakly outlined in brownish white.

The present geographic race has a limited distribution which borders that of *curvicauda curvicauda* in the north and northwest; it is known from Whitneyville, Maine, to Aweme, Manitoba, being found typical only in the Canadian Zone.

*Specimens Examined*: 15; 6 males and 9 females.

Whitneyville, Maine, VIII, 12, 1913, (Morse; in bogs), 1 ♂, 2 ♀, [Morse Cln.].

Cherryfield, Maine, VIII, 8, 1913, (Morse; in bogs), 1 ♀, [Morse Cln.].

Orono, Maine, VIII, 30, 1913, (Morse; in bog), 1 ♀, [Morse Cln.].

Aweme, Manitoba, VIII, 19 to 22, 1909, (N. Criddle; sand hills, on hillside, dry prairie and in tall dry vegetation), 2 ♂, 3 ♀, *type, allotype, paratypes*; IX, 15, 1907, (N. Criddle), 3 ♂, 1 ♀, *paratypes*, [all Hebard Cln.].

West Point, Nebraska, (L. Bruner), 1 ♀, [Hebard Cln.].

**Scudderia curvicauda curvicauda** (DeGeer) (Pl. IX, fig. 7; pl. X, fig. 26.)

1773. *Locusta curvicauda* DeGeer, Mém. Hist. Ins., iii, p. 446, pl. 38, fig. 3. [Pennsylvania, probably Philadelphia.]

1841. *Phaneroptera angustifolia* Harris, Ins. Inj. Veget., 1st ed., p. 129. [Massachusetts.]

Lugger's figures of this species,<sup>11</sup> which he recorded from Minnesota as *S. furculata*,<sup>12</sup> are very poor, the figure of the entire insect is crude and the drawing of the genitalia in both this figure and that of the apex of the male abdomen is very incorrect.

Though structurally very distinct, the often similar appearing *S. texensis* is easily confused with the present insect in the female sex. The present senior author has once recorded this species as *S. texensis*<sup>13</sup> from between Cedar Grove and Chatsworth, New Jersey. We find that *curvicauda curvicauda* is distinguishable from *texensis* in its somewhat more robust structure with proportionately shorter dorsum of the pronotum, wider tegmina and less glossy appearance; in the male the genitalia<sup>14</sup> are very different and in the female the ovipositor is slightly less sharply bent upward and slightly more full toward the apex.

*Measurements (in millimeters) of extremes*

♂	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of subgenital plate
Gun Lake, Michigan... (6) <sup>15</sup>	5.4-6	33.2-37.2	7-7.8	25.2-26.8	7.2-7.8
Rye Beach, New Hampshire..... (1)	5.5	33.3	7.4	26.4	7
Marion, Massachusetts. (3)	5.6-5.9	34-35.3	7.7-8.1	25.9-26	7-7.4
Yonkers, New York.... (3)	6	32.8-36	7.7-8	27.4-29.5	7.5-7.6
Rockville, Pa..... (2)	6	35.9-36	8-8.1	27-29	7.5-7.6
Atsion, New Jersey.... (9)	5.8-6	34.6-36.1	7.3-7.7	26-26.4	7.6-7.8

<sup>11</sup> Orth. of Minn., p. 217, figs. 139, 140, (1898).

<sup>12</sup> Though a synonym of *S. mexicana*, as has been shown by Scudder, *furculata* has not only been confused with *S. curvicauda*, but with *S. furcata* as well.

<sup>13</sup> Entom. News, xv, p. 330, (1904).

<sup>14</sup> In the discussion under *pistillata* and in the key, the characters of the disto-dorsal abdominal segment of the present species are fully described.

<sup>15</sup> In the tables of measurements throughout the present paper, the figures in parentheses immediately after the localities indicate the number of specimens measured.

*Measurements (in millimeters) of extremes—Continued*

♀	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of ovipositor
Gun Lake, Michigan... (3)	5.6-5.9	32.4-34.9	7.2-8.3	25.3-28.7	7.6-8
Marion, Massachusetts. (2)	5.6-5.8	33-35	7.7-7.8	26.4-29	7.7-7.8
Yonkers, New York... (2)	5.7-6.2	33.3-35.6	7-7.4	27-29	7.7-8
Rockville, Pa..... (31)	5.7-6.3	34.4-37.2	6.9-7.7	26.5-31	8-8.4
Chestnut Hill, Pa..... (1)	6.1	36.4	7.7	30.8	8
Atsion, New Jersey... (10)	5.5-6.1	31.9-35.1	7-7.3	27.7-31	8-8.3

In the series before us the specimens from the Pine Barrens of New Jersey have in almost every case the lateral angles of the pronotum outlined in yellowish. This coloration is only found in a few other specimens of the present series.

This species is common and widely distributed through the undergrowth of the woods in the Pine Barrens of New Jersey, in this region *S. texensis* is common but is found only in marshes, swamps or bogs.

At Reega, New Jersey, a typical pine barren locality, adults were found, in 1914, to appear about the middle of July, reaching their greatest abundance by the first of August and being represented almost entirely by females toward the end of that month. The species was heard there in the daytime giving at long intervals a brief note "zzikk" much as has been observed in *S. pistillata*; at night it was often to be heard giving single or a succession of rather resonant and loud stridulations.

East of the Appalachians, the present race is found from Fryeburg, Maine, and Brandon, Vermont, to southernmost New Jersey and Pennsylvania. Further west it is widely distributed from a narrow area of intergradation with *S. c. borealis*, southward to the much broader area of intergradation with *S. c. laticauda*, indications of which are first found in material from the latitude of southern Kentucky.

*Specimens Examined:* 185; 79 males, 104 females and 2 female nymphs.

Jaffrey, New Hampshire, VIII, 15 to IX, 11, 1896, (S. Henshaw), 2 ♂, [M. C. Z.].

Rye Beach, New Hampshire, IX, 2, 1913, (H.), 1 ♂.

Marion, Massachusetts, IX, 1, 1905, (H.), 3 ♂, 2 ♀.

Northfield, Massachusetts, (Mrs. D. Pierson), 1 ♀, [U. S. N. M.].

Melrose Highlands, Massachusetts, VII, 15, 1908, (D. H. Clemons), 1 ♀, [U. S. N. M.].

Milton, Massachusetts, VIII, 28, 1897, (F. H. Sprague), 1 ♂, 1 ♀, [M. C. Z.].

Forest Hills, Massachusetts, VIII, 16 to 22, 1877, 3 ♀, [M. C. Z.].

Wollaston, Massachusetts, VIII, 15 to IX, 1895, 1 ♂, 2 ♀, [M. C. Z.].

Scituate, Massachusetts, VIII, 29, 1897, (F. H. Sprague), 1 ♀, [M. C. Z.].

Walpole, Massachusetts, VIII, 1 to 30, 1897, (F. H. Sprague), 5 ♂, 3 ♀, [M. C. Z.].

Lake Mahopac, New York, (T. D. O'Connor), 1 ♀, [Hebard Chn.].

Yonkers, New York, VIII, 1910, (E. R. Casey), 3 ♂, 2 ♀, [Casey Chn.].

Beaver, Pennsylvania, VIII, 1, 1 ♂, [Pa. St. Dept. Zool.].

Beatty, Pennsylvania, (Brugger), 1 ♂, 3 ♀, [A. N. S. P.].

Heckton Mills, Pennsylvania, VIII, 31, 1909, 1 ♀, [Pa. St. Dept. Zool.].

Rockville, Pennsylvania, VII, 29 to VIII, 5, 22 ♂, 31 ♀, [Pa. St. Dept. Zool.].

Penryn, Pennsylvania, VIII, 18, 1 ♂, [Pa. St. Dept. Zool.].

Orrtanna, Pennsylvania, IX, 4, 1 ♀, [Pa. St. Dept. Zool.].

Chestnut Hill, Pennsylvania, IX, 13, 1903, (H.), 1 ♀.

East Plains, Ocean County, New Jersey, VIII, 24, 1914, (R. & H.; ground oak and pine and various heaths), 1 ♂, 5 ♀.

Atsion, New Jersey, VII, 30, 1911, (R. & H.), 8 ♂, 9 ♀; IX, 2, 1901, (R.; undergrowth in woods), 2 ♂.

Parkdale, New Jersey, VII, 30, 1911, (R. & H.; undergrowth in woods), 9 ♂, 9 ♀.

Stafford's Forge, New Jersey, VIII, 26 to 31, 1907, (R.), 4 ♀.

Mays Landing, New Jersey, VIII, 29, 1914, (H.; in boggy pine barrens), 1 ♀.

Reega, New Jersey, VII, 20 to VIII, 16, 1914, (H.; undergrowth in pine barrens), 8 ♂, 10 ♀, 2 ♀ n.

Sea Isle Junction, New Jersey, VIII, 3 to 8, 1908, (H. Fox), 1 ♂, 7 ♀, [A. N. S. P.].

Wildwood Junction, New Jersey, VII, 27, 1914, (H.; low plants in woods), 1 ♂, 1 ♀.

Dias Creek, New Jersey, VII, 20, 1914, (H.; undergrowth in oak woods), 1 ♂.

Cranmoor, Wisconsin, VIII, 6, 1909, (C. W. Hooker), 1 ♀, [U. S. N. M.].

Gun Lake, Michigan, VII, 13 to 26, 1912, (M. A. Carriker, Jr.), 7 ♂, 2 ♀, [Hebard Chn.].

Pawpaw, Michigan, VI, 1898, 1 ♀, [Hebard Chn.].

**Scudderella curvicauda laticauda** Brunner (Pl. IX, figs. 10 and 12; pl. X, fig. 25.)

1878. *Sc[udderella] laticauda* Brunner, Monogr. Phaner., p. 238. [Georgia.]

1897. *Scudderella laticauda* Saussure and Pietet, Biol. Cent. Amer., Orth., i, p. 330. (In part = 1st variety.) [Georgia.]

1907. *Scudderella laticauda* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1907, p. 300. [San Pablo and Gainesville, Florida.]

The present geographic race has been frequently recorded as *S. curvicauda* from the southeastern United States.

The characters given by Brunner in his description of *laticauda* are somewhat misleading. The lateral angles of the pronotum are only very slightly more rounded than in *c. curvicauda*, while the production and apical cleavage of the subgenital plate offers no differential factor. The lateral angles of the pronotum in *strigata* are very much more broadly rounded and it was Brunner's undue emphasis on this character which caused Scudder to name as a mere color form of the present insect that aberrant species, which can be further separated at a glance by the very decidedly narrower tegmina.

As *S. c. borealis* is the race of the extreme northern portions of the range of *curvicauda*, so *S. c. laticauda* is the race of the extreme southern portions of the range of that species. This race is chiefly distinguishable by its larger size, the proportionately narrower tegmina (by taking averages of the entire typical series before us we find that in *curvicauda curvicauda* the tegminal width is contained in the length of the same very little over  $4\frac{1}{2}$  times, in *c. laticauda* nearly 5 times), slightly more rounded lateral angles of the pronotum, somewhat larger produced pistillate portion of the supra-anal plate of the male and decidedly larger ovipositor and subgenital plate of the female, with the former much more weakly bent upward and the ventral margin more broadly arcuate.

*Measurements (in millimeters) of extremes*

Material intermediate between *S. c. curvicauda* and *S. c. laticauda*

♂	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of subgenital plate
Orange, Virginia.....(1)	6.2	38.3	8.3	30.5	8.2
Charlotte, N. C.....(3)	6.4-6.5	37-38.7	7-8.1	30.6-32	8-8.2
Stone Mountain, Ga... (1)	6.3	40.2	8	31.6	8.4
Doucette, Texas.....(2)	6.2-6.3	37-37.4	7.4-7.7	30.9-31.1	7.9-8.1

Material intermediate between *S. c. curvicauda* and *S. c. laticauda*

♀	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of ovipositor
Petersburg, Virginia... (2)	5.9-6	34.7-36.2	6.9-7.3	29.8-30.4	8.8-9
Charlotte, N. C..... (3)	5.7-6	35.3-36.2	7.1-7.2	29.5-31.2	8.7-9.1
Stone Mountain, Ga... (1)	6.7	40	8.3	32.7	9.2
Doucette, Texas..... (1)	6.3	36.7	7.4	33.4	9

*S. curvicauda laticauda*

♂	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of subgenital plate
Winter Park, N. C.... (1)	6.7	36.9	7.7	31.8	8
Billy's Island, Ga.... (20)	6.4-7.3	35.8-39.7	8-8.3	32-32.7	8.2-8.7
Albany, Georgia ..... (1)	6.1	33.2	7.1	28.7	8.1
Spring Creek, Georgia (1)	6.3	39.1	7.8	32	8.7

♀	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of ovipositor
Wilmington, N. C.... (1)	7	39	7.6	33.4	10.2
Yemassee, S. C..... (3)	6.5-6.7	36.5-37.8	7.1-7.5	31.6-32.5	9.7-10.2
Billy's Island, Ga.... (13)	6.1-7.1	35.7-39	7.2-8.3	31.4-33	9.6-10.3
Albany, Georgia ..... (3)	5.9-6.1	36.3-38.8	6.7-7.9	30.3-31.4	9.4-9.6
Jacksonville, Florida... (4)	7.7-8.3	36.3-40	7.7-8.3	29.8-35.2	10.1-11.1

The ovipositor in *c. laticauda* averages 3.3 mm. in both proximal and mesal width.

The material before us from all of the localities in Virginia and North Carolina (excepting Wilmington and Winter Park), from the Piedmont plain and mountains of South Carolina and Georgia, from the mountains of Alabama and Tennessee, from southern Arkansas and Oklahoma and from all of Texas as far west as the species is distributed, is not typical of the present race. The great majority of these specimens average nearer to it than to *curvicauda curvicauda*,<sup>16</sup> this is least pronounced in the series from northern Virginia, southern Arkansas and Oklahoma and from Texas. The area of intergradation is consequently found to be very wide in the present case.

<sup>16</sup> Such an intermediate individual is the female recorded by the authors from Raleigh, North Carolina, as *S. curvicauda*, Proc. Acad. Nat. Sci. Phila., 1910, p. 636, (1911).



A very few specimens in the series before us have the lateral angles of the pronotum weakly outlined in yellowish.

Typical *S. c. laticauda* is found from Wilmington, North Carolina to Sanford, Florida, and westward as far as Monticello, Mississippi; the fall line constituting a considerable portion of the northern boundary of its range.

*Specimens Examined*: 63; 26 males and 37 females. Intermediates: 67; 28 males, 37 females and 2 immature males.

Wilmington, North Carolina, IX, 8, 1911, (R. & H.), 1 ♀.

Winter Park, North Carolina, IX, 7, 1911, (R. & H.), 1 ♂.

Denmark, South Carolina, VIII, 15, 1903, (Morse), 1 ♀, [Morse Cln.].

Yemassee, South Carolina, IX, 4, 1911, (R. & H.; in long-leaf pine woods with clumps of oaks on higher ground), 3 ♀.

Albany, Georgia, VIII, 1, 1913, (R. & H.; scarce in undergrowth of pine woods), 1 ♂, 3 ♀.

Spring Creek near Bainbridge, Georgia, VI, 1911, (J. C. Bradley), 1 ♂, 8 ♀, [Ga. State Cln.].

Mixon's Hammock, Okefenokee Swamp, Georgia, VI, 16, 1912, (J. C. Bradley), 1 ♀, [Cornell Univ.].

Billy's Island, Okefenokee Swamp, Georgia, VI, VII, IX, 1912 to 1913, (J. C. Bradley), 20 ♂, 13 ♀, [Cornell Univ.].

Jacksonville, Florida, VIII, 25, 1911, (R. & H.), 2 ♀; VIII, 1885, (Ashmead), 1 ♀, [Hebard Cln.]; IX, 7, 1913, (W. T. Davis), 1 ♀, [Davis Cln.].

Atlantic Beach, Florida, VIII, 24, 1911, (R. & H.; in dense low undergrowth between pine woods and "hammock"), 1 ♀.

Live Oak, Florida, VIII, 10, 1903, (Morse), 1 ♂, [Morse Cln.].

Flomaton, Alabama, VIII, 2, 1903, (Morse), 1 ♀, [Morse Cln.].

Nugent, Mississippi, VII, 20, 1905, (Morse), 2 ♂, 1 ♀, [Morse Cln.].

Intermediate material between *S. curvicauda curvicauda* and *S. c. laticauda*

Glencarlyn, Virginia, VIII, 12, (Caudell), 2 ♂, 2 ♀, [U. S. N. M.].

Orange, Virginia, VII, 24, 1913, (R. & H.), 1 ♂.

Wytheville, Virginia, IX, 2, 1903, (Morse), 1 ♂, [Morse Cln.].

Petersburg, Virginia, VII, 23, 1913, (R. & H.; in green vegetation in pine woods and in swampy spot), 2 ♀.

Norfolk, Virginia, IX, 8, 1903, (Morse), 1 ♀, [Morse Cln.].

Weldon, North Carolina, VII, 24, 1913, (R. & H.; undergrowth of huckleberry and other sand-loving bushes in pine and oak woods), 2 ♀, 1 ♂ n.

Charlotte, North Carolina, VII, 27, 1913, (R. & H.; not scarce among tufts of very green grass in restricted areas in short-leaf pine woods), 3 ♂, 3 ♀.

Fayetteville, North Carolina, IX, 9, 1911, (R. & H.; in moist place in woods), 1 ♀.

Morganton, North Carolina, VII, 20, 1903, (Morse), 1 ♀, [Morse Cln.].

Lookout Mountain, Tennessee, VIII, 23, 1903, (Morse), 1 ♂, [Morse Cln.].

Spartanburg, South Carolina, VIII, 6, 1913, (H.), 3 ♂.



Columbia, South Carolina, VII, 28, 1913, (R. & H.), 1 ♀.

Sand Mountain, Georgia, VII, 9, 1905 and VIII, 25, 1903 (Morse), 3 ♂, 3 ♀, [Morse Cln.].

Jasper, Georgia, VIII, 5, 1913, (R.), 1 ♂ n.

Marietta, Georgia, VII, 27, 1903, (Morse), 2 ♂, [Morse Cln.].

Currahee Mountain, Georgia, VIII, 5, 1913, (H.; scarce in luxuriant mountain vegetation), 3 ♀.

Vicinity of Stone Mountain, Georgia, VIII, 3, 1913, (R. & H.; undergrowth in pine woods), 1 ♂, 1 ♀.

Warm Springs, Georgia, VIII, 9 to 10, 1913, (R.; scarce in luxuriant vegetation), 2 ♀.

Macon, Georgia, VII, 30 to 31, 1913, (R. & H.; undergrowth in short-leaf pine woods), 2 ♀.

Valley Head, Alabama, VII, 11, 1905, (Morse), 1 ♀, [Morse Cln.].

Mena, Arkansas, VII, 30 and 31, 1905, (Morse), 3 ♂, 3 ♀, [Morse Cln.].

Eagleton, Arkansas, VIII, 3, 1905, (Morse), 3 ♂, 4 ♀, [Morse Cln.].

Howe, Oklahoma, VIII, 4, 1905, (Morse), 1 ♀, [Morse Cln.].

Haileyville, Oklahoma, VIII, 6, 1905, (Morse), 1 ♀, [Morse Cln.].

South McAlester, Oklahoma, VIII, 7, 1905, (Morse), 2 ♂, 1 ♀, [Morse Cln.].

Dallas, Texas, (Boll), 1 ♂, [Hebard Cln.].

Bonita, Texas, VIII, 14, 1905, (Morse), 1 ♀, [Morse Cln.].

Doucette, Texas, VII, 24, 1912, (H.), 2 ♂, 1 ♀.

**Scudder** *strigata* Scudder (Pl. IX, figs. 6 and 13; pl. X, fig. 18.)

1898. *Scudder* *laticauda* form *strigata* Scudder, Proc. Am. Acad. Arts and Sci., xxxiii, p. 280, fig. 4. [Jacksonville, Florida.]

In describing *S. laticauda*, which is the southern geographic race of *S. curvicauda*, Brunner has certainly emphasized much too strongly the slightly more rounded lateral angles of the pronotum which are found in this race, and has given this character a prominent position in his key. Following this character only, Scudder determined the pair of specimens at present under consideration as *laticauda* (for these have very broadly rounded lateral angles of the pronotum), ignoring the other striking differences which exist between them and any other species of the genus. He, however, gave for the present specimens the name *strigata* to designate what appeared to him to be a mere color variety of *laticauda*, and briefly described the more prominent differences in coloration. As these two specimens represent an otherwise unknown and very distinctive species, showing nearest affinity to *S. curvicauda*, the name *strigata* must be used for this species.

The characters of distinctive differentiation are the very narrow

tegmina, very broadly rounded lateral angles of the pronotum, striking coloration and the genitalia in both sexes.

Described from a pair from the same locality.

*Single Type* here chosen.—♂; Jacksonville, Florida. (T. J. Priddey.) [Hebard Collection ex Bruner.]

*Description of Type*.—Size large, form decidedly slender. Eyes slightly more prominent than in *S. curvicauda*. Pronotum more slender than in that species with lateral angles very broadly and strikingly rounded (very much more so than in *S. c. laticauda* which has these angles slightly more rounded than in *curvicauda curvicauda*); lateral lobes with ventral portion of caudal margin almost straight to a broadly rounded obtuse angulation just below the humeral sinus. Tegmina extremely narrow, much narrower than the pronotal length. Production of disto-dorsal abdominal segment similar to that of *curvicauda* but with fureate portion short, truncate, with dorsal surface of same strongly declivent distad. Subgenital plate much as in *curvicauda*.

The unique female, bearing the same data as the type, is the *Allotype*.

*Description of Allotype*.—Slightly larger but with proportions similar to the type. Ovipositor approximately as long as in *curvicauda* but of wholly different shape, having the dorsal margin bent sharply upward proximad while the ventral margin is evenly but more strongly arcuate than in that species; beyond the bend the ovipositor becomes decidedly narrower.

*Measurements (in millimeters)*

	Jacksonville, Florida	
	♂	♀
Length of pronotum.....	5.3	5.7
Length of tegmen.....	33.4	34.2
Greatest width of tegmen.....	4.7	4.8
Length of wing.....	39.7	39.4
Length of subgenital plate.....	7.4	

We are unable to give the length of the caudal femora as these have been destroyed in both specimens. In the single female before us the ovipositor is 8.2 mm. in length, 2.7 mm. in width proximad, and 2.4 mm. in width mesad.

Both specimens are very strikingly and similarly marked. The general coloration is cource green, much faded except on the tegmina, these appendages have the region of the anal vein and sutural margin bone brown, thus forming a heavy line from the base to the apex of the tegmen, the anal field is cinnamon with a

bone brown marking at the proximal portion of the free margins forming a single large median spot when the tegmina are closed. The lateral angles of the pronotum are pale yellowish with the lateral lobes just below these marked with an obscure band of brown. The abdominal segments are marked meso-laterad with maculations of bone brown forming a broad but interrupted stripe. The cephalic and median femora are speckled with bone brown and are further irregularly and narrowly biannulate with this color. In the female the distal portion of the cerci and proximal portions of the basal plicae of the ovipositor are unusually dark for the species of the genus.

Jacksonville, Florida, is the only locality known for this unusual and striking species, which must be considered one of the rarest, most local and probably least widely distributed species of North American Orthoptera.

*Specimens Examined*: 2; 1 male and 1 female.

Jacksonville, Florida, (T. J. Priddey), 1 ♂, 1 ♀, *type, allotype*, [Hebard Cln. ex Bruner].

**Scudderia hemidactyla** new species (Pl. IX, figs. 11, 15, 16 and 17; pl. X, fig. 22.)

A very distinct and anomalous species showing a certain amount of affinity to *S. septentrionalis* in the decided reduction of the supra-anal plate in the male and in the similar subgenital plate in the same sex, which is however less decidedly angulate-emarginate distad. The production of the supra-anal plate in the male bears distad small, strongly compressed, vertical lateral flanges; the greatest similarity in this character is found elsewhere in the genus in *S. texensis*, but in all other characters of this reduced but greatly specialized appendage the species is unique. The species is very glossy, with rather more prominent eyes than is usual in the genus, in these respects resembling *S. paronae*. Characters of the pronotum and armament of the caudal femora separate the species further from any other of the genus.

*Type*.—♂; Caparo, Trinidad, June, 1913. (S. M. Klages.) [Acad. Nat. Sci. Phila., Type No. 524.]

*Description of Type*.—Similar in size to typical *S. furecata furecifera* but with deeper lateral lobes of the pronotum, more attenuate tegmina and shorter limbs. Head similar to *S. paronae*, but with inter-fastigial suture narrower; inter-ocular space decidedly narrower and eyes larger so that when seen from above the inter-ocular space is not as wide as one of

the eyes; antennae uniform in coloration. Pronotum short with nearly parallel lateral angles rounding everywhere evenly (and more broadly than in other species of the genus except *S. strigata*) into the lateral lobes which are distinctly deeper than long, cephalic margin of lateral lobes very broadly rounded, passing through the ventro-cephalic angle into the oblique, nearly straight caudal margin, humeral sinus shallower than in the other species of the genus. Tegmina shining, similar to those of *paronae* but proportionately narrower with transverse veinlets sub-obsolete and the entire surface an intricate network of minute veinlets; wings as in *paronae*. Supra-anal plate with proximal width greater than length, triangularly produced with lateral margins weakly concave and apex bifid, V-emarginate. This apex when seen from below is found to be made up ventrad of two lateral perpendicular folds with crassate margins which curve out and around the tips of the incurved cerci ventro-proximad and then join mesad on the ventral surface of the plate; near the very apex of these folds distad spring out from their sides small strongly compressed vertical lateral flanges which are triangular with apex rounded, these would if brought in contact with the subgenital plate embrace the same. Cerci nearly intermediate between the type found in *S. septentrionalis* and the normal type found in the genus; crassate, becoming evenly and very weakly more attenuate with a slight arcuation to apex, which is suddenly bent inward and armed with a sharp black tooth directed at a right angle to the distal portion of the cercal shaft. Subgenital plate depressed throughout, acute-angulate emarginate distad to a depth about one-half the distal width of the plate. Cephalic and median limbs similar to those of *paronae*, caudal limbs shorter and more robust than in that species. Caudal femora distinctive in having both ventral margins armed with small teeth (not spines), caudal tibiae with all four margins thickly supplied with heavy spines.

*Allotype*.—♀; same data as the type.

*Description of Allotype*.—Very similar to type but larger with proportionately broader tegmina. Ovipositor gently arcuate, not at all bent, long and broad to the immediate apex which is more suddenly rounded than in the other species of the genus, distal half of dorsal valves and extreme distal portion of ventral valves margined with small, even and rounded teeth. Subgenital plate triangular with truncate apex, this plate unusually short for the genus, not extending to the juncture of the ventral valves of the ovipositor. Limbs and armament of same as in the type.

*Measurements (in millimeters)*

	Paramaribo, Dutch Guiana	Caparo, Trinidad	
	♂	♂ Type	♀ Allotype
Length of body.....	20.4	19.6	21
Length of pronotum.....	5.1	5	5.7
Caudal width of pronotum.....	3.3	3.1	3.8
Greatest depth of lateral lobes of pronotum.....	3.8	3.7	4
Greatest length of lateral lobes of pronotum.....	3.4	3.4	3.8
Length of tegmen.....	28.7	29.9	32.9
Greatest width of tegmen.....	5.8	5.7	6.9
Length of caudal femur.....	21.4	22.9	25.8
Length of subgenital plate.....	4.9	5.1	
Length of ovipositor.....			8.1, width 2.1

The specimen from Paramaribo is very similar to the type, the pronotum has the lateral angles more divergent caudad, showing that this character is variable in the present species. In this respect the allotypic female is nearly intermediate between the two specimens discussed above.

In coloration the specimens before us are shining serpentine green, probably faded from a much brighter shade, with the lateral angles of the pronotum unmarked.

*Specimens Examined:* 6; 4 males and 2 females.

Caparo, Trinidad, VI, 1913, (S. M. Klages), 3 ♂, 2 ♀, *type, allotype and paratypes*, [A. N. S. P.].

Paramaribo, Dutch Guiana, (K. Mayo), 1 ♂, [A. N. S. P.].

**Scudderia texensis** Saussure and Pictet (Pl. IX, fig. 5; pl. X, fig. 23.)

1897. *Scudderia texensis* Saussure and Pictet, Biol. Cent.-Amer., Orth., i, p. 330, pl. xv, figs. 18, 19. [Dallas, Texas.]

Saussure and Pictet failed to associate the sexes of the present species and figured the female as *S. laticauda*.<sup>17</sup> The present species has been recorded from Miami, Florida by the authors as *S. curvicauda*<sup>18</sup> and all of the material recorded by Bruner from Kansas and Nebraska as *S. curvicauda* belongs to this insect.

<sup>17</sup> Biol. Cent.-Amer., Orth., i, p. 330, pl. xv, fig. 15, (1897).

<sup>18</sup> Proc. Acad. Nat. Sci. Phila., 1905, p. 42, (1905).

This name had been generally used by authors for *texensis* until Scudder's revision of the genus in 1898, and the present species was so recorded by Lugger in that year.

Males of the present species are readily separated from other species of the genus by the characters given in the key. Females, however, might often be confused with females of *S. curvicauda* were the differential characters not carefully studied. *S. texensis* has a decidedly more glossy appearance than *curvicauda* and is a more attenuate insect with the dorsum of the pronotum slenderer and the lateral angles usually weakly but appreciably concavo-divergent caudad, these lateral angles are usually outlined in yellowish in the present species but frequent specimens are found in which this marking is subobsolete or wholly absent. The obscurity or absence of this marking is more often met with in southern and western material than in series from the northern Atlantic States. Females of *texensis* may be further separated from those of *curvicauda* by the ovipositor which is more sharply bent upward, more slender and armed with somewhat heavier teeth than in that species.

*Measurements (in millimeters) of extremes*

♂	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of subgenital plate
Saunderstown, R. I. . . . (6)	5.6-5.7	33-35.3	6.7-7.1	26-26.9	7.3-8
Tinicum Island, Pa. . . (19)	5.9-6.2	35.8-36.8	7.1-7.7	27.7-29	7.7-8
Yemassee, S. C. . . . . (15)	5.4-5.9	32.4-33.3	6.1-6.7	27-29	7-7.3
Miami, Florida. . . . . (2)	5.3-5.8	30.4-32	6.3-6.5	26.3-26.4	7-7.1
North Platte, Nebr. . . . (1)	6.5	37.6	7.4	29.2	7.9
La Marque, Texas. . . . (1)	6.1	34.5	7		7.8
♀	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of ovipositor
Saunderstown, R. I. . . . (3)	5.9-6	33-36.7	7-7.3	27-27.4	7.4-8
Tinicum Island, Pa. . . (11)	5.9-6	33.3-35.4	7-7.4	26.4-28	7-7.4
Yemassee, S. C. . . . . (13)	5.2-6	28.8-32.7	5.8-6.4	26.4-29.3	6.7-7.1
Miami, Florida. . . . . (1)	5.7	32	6.6	28.7	7
North Platte, Nebr. . . . (6)	6-6.3	34-38.2	7-8.2	26-29	7.8-8.4
La Marque, Texas. . . . (4)	5.7-5.8	31.7-35	6.3-6.4	27-29.9	6.9-7



It is evident, from the material which we have examined, that the present species decreases somewhat in size in its southern distribution, but even greater variation is sometimes found in a series from a single locality.

The species is almost invariably found in or near marsh, swamp or bog. It is one of the very few destructive Phaneropterids found in the United States, doing particular damage to cranberry crops.

During the summer of 1914 the species was frequently observed on the coast of New Jersey along the salt marshes, where, after dark, it would frequently be found locally abundant in areas of *Scirpus*, resting head down and motionless near the tips of these rushes and frequently beaded with dew. On bright warm afternoons it was observed in the taller vegetation near the border of the salt marshes, where the males were moving actively about emitting their rather prolonged and harsh stridulation.

This insect is known from Norway, Maine, to extreme southern Florida, while the westernmost localities at which it has been taken are<sup>19</sup> Forsyth, Montana; Casper, Wyoming; Morton County, Kansas and Clarendon and Rosenberg, Texas.

*Specimens Examined*: 191; 104 males, 79 females, 5 immature males and 3 immature females.

Seabrook, New Hampshire, (H. A. Eaton), 1 ♂, [U. S. N. M.].

North Saugus, Massachusetts, IX, 12, 1906, (C. C. Gowdey), 1 ♂, [U. S. N. M.].

Melrose Highlands, Massachusetts, VII, 15, 1908, (D. H. Clemons), 1 ♂ n., [U. S. N. M.].

Saunderstown, Rhode Island, IX, 9, 1913, (H.; in bog), 6 ♂, 3 ♀.

Erie, Pennsylvania, 2 ♀, [Pa. St. Dept. Zool.].

Beaver, Pennsylvania, IX, 13, 1 ♂, [Pa. St. Dept. Zool.].

Indiana, Pennsylvania, VIII, 14, 1 ♂, [Pa. St. Dept. Zool.].

Duncannon, Pennsylvania, VIII, 8, 1 ♂, [Pa. St. Dept. Zool.].

Harrisburg, Pennsylvania, VIII, 8 to X, 15, 1909, 5 ♂, [Pa. St. Dept. Zool.].

Rockville, Pennsylvania, VII, 29 to VIII, 22, 3 ♂, 1 ♀, [Pa. St. Dept. Zool.].

Enola, Pennsylvania, IX, 7, 1909, 1 ♀, [Pa. St. Dept. Zool.].

Eberly's Mills, Pennsylvania, VIII, 27, 1909, 1 ♀, [Pa. St. Dept. Zool.].

Philadelphia Neck, Pennsylvania, IX, 21, 25, 1904, (H. W. Wenzel), 2 ♂, 2 ♀, [A. N. S. P.].

<sup>19</sup> We feel certain that if Scudder's record for the species from Ogden, Utah, is correct, it is based upon an accidental importation of some sort.



Cornwells, Bucks County, Pennsylvania, IX, 7, 1914, (H.), 1 ♂, 2 ♀; X, 1906, (R. & H.), 1 ♂, 1 ♀.

Tinicum Island, Pennsylvania, VIII, 13 to IX, 29, 1904 to 1913, (R. & H.; in marsh), 19 ♂, 11 ♀.

Pemberton, New Jersey, IX, 6, 1913, (H. B. Scammell), 1 ♂, 2 ♀, [U. S. N. M.].

Stafford's Forge, New Jersey, IX, 16, 1905, (H.), 2 ♂.

Ventnor, New Jersey, VIII, 5 to 17, 1914, (H.; in marshy depressions of sand areas and on bayberry bushes), 3 ♂.

Margate City, New Jersey, VIII, 17 and 24, 1914, (H.; in salt marsh), 1 ♂ n., 2 ♀ n.

Pleasantville, New Jersey, VIII, 17, 1914, (H.; in salt marsh), 1 ♂.

Tuckahoe, New Jersey, VIII, 26, 1914, (H.; in fresh water marsh), 1 ♀.

Cedar Springs, New Jersey, VIII, 26, 1914, (H.; in fresh water marsh), 3 ♂, 3 ♀.

Ocean View, New Jersey, VII, 27, 1914, (H.; edge of salt marsh), 1 ♂.

Dennisville, Cape May County, New Jersey, VIII, 8, 1908, (H. Fox; in tall grass on edge of salt marsh), 1 ♀, [A. N. S. P.].

Peermont, Cape May County, New Jersey, VIII, 14, 1908, (H. Fox; open woods), 1 ♀, [A. N. S. P.].

Plummers Island, Maryland, VIII, 27, 1909, (Caudell), 1 ♂ n., [U. S. N. M.].

Virginia Beach, Virginia, VII, 2 and 4, 1903, (Morse), 1 ♂, 1 ♀, 1 ♀ n.; IX, 7, 1903, (Morse), 1 ♂, [all Morse Cln.].

Selma, North Carolina, VII, 7, 1903, (Morse), 1 ♂, [Morse Cln.].

Raleigh, North Carolina, VII, 9, 1903, (Morse), 1 ♀, [Morse Cln.].

Wrightsville, North Carolina, IX, 7, 1911, (R. & H.; edge of salt marsh), 1 ♂, 3 ♀.

Winter Park, North Carolina, IX, 7, 1911, (R. & H.), 1 ♂, 3 ♀.

Yemassee, South Carolina, IX, 4, 1911, (R. & H.), 15 ♂, 14 ♀.

Sand Mountain, Georgia, VII, 9, 1905, (Morse), 1 ♂, [Morse Cln.].

Tybee Island, Georgia, IX, 2, 1911, (R. & H.; in low undergrowth on sand dunes), 2 ♂, 2 ♀.

Jesup, Georgia, IX, 1, 1911, (R. & H.), 2 ♂, 2 ♀.

Billy's Island, Okefenokee Swamp, Georgia, VI, 1912, IX, 1913, (J. C. Bradley), 7 ♂, [Cornell Univ.].

Honey Island, Okefenokee Swamp, Georgia, VI, 1, 1912, (J. C. Bradley), 1 ♂, [Cornell Univ.].

Albany, Georgia, VIII, 1, 1913, (R. & H.; in undergrowth of long-leaf pine woods where low swamp-loving plants were present), 1 ♀.

Tifton, Georgia, IX, 8, 1910, (J. C. Bradley), 1 ♂, [Ga. State Cln.].

Bainbridge, Georgia, IX to X, 1910, (J. C. Bradley), 1 ♂, [Ga. State Cln.].

South Jacksonville, Florida, IX, 28, 1913, (W. T. Davis), 1 ♂, 1 ♀, [Davis Cln.].

Atlantic Beach, Florida, VIII, 24, 1911, (R. & H.), 1 ♂ n.

Live Oak, Florida, VIII, 26, 1911, (R. & H.), 1 ♂, 1 ♀ n.

- Newberry, Florida, XI, 19, 1911, (W. T. Davis), 1 ♀, [U. S. N. M.].  
 Hastings, Fla., XII, 5, 1901, (A. J. Brown), 1 ♀, [Morse Cln.].  
 Lake Maxinkuckee, Indiana, (Evermann), 1 ♂, [U. S. N. M.].  
 Clarksville, Tennessee, X, 4, 1910, (S. E. Crumb; on tobacco), 1 ♂, [U. S. N. M.].  
 Forsyth, Montana, VII, 27, 1909, (H.), 1 ♀.  
 Casper, Wyoming, VIII, (McCook), 1 ♂, [Hebard Cln.].  
 North Platte, Nebraska, VII, 28, 1910, 2800 feet, (R. & H.; marshy spots on river plain), 1 ♂, 6 ♀.  
 Morton County, Kansas, VIII, 5, 1911, 2800 feet, (F. X. Williams), 1 ♂, [Univ. Kans. Cln.].  
 Gulfport, Mississippi, VII, 21, 1905, (Morse), 1 ♂, [Morse Cln.].  
 Buras, Louisiana, VII, 23, 1905, (Morse), 1 ♂, [Morse Cln.].  
 Ashdown, Arkansas, VII, 27, 1905, (Morse), 1 ♀, [Morse Cln.].  
 Base of Mount Sheridan, Oklahoma, VIII, 26, 1905, (Morse), 1 ♂, 3 ♀, [Morse Cln.].  
 Cache, Oklahoma, VIII, 23, 1905, (Morse), 1 ♀, [Morse Cln.].  
 Clarendon, Texas, VIII, 18, 1905, (Morse), 3 ♂, 1 ♀, [Morse Cln.].  
 Denison, Texas, VIII, 12, 1905, (Morse), 1 ♂, [Morse Cln.].  
 La Marque, Texas, VII, 23, 1912, (H.; areas of tall weeds on low prairie), 1 ♂, 4 ♀.  
 Rosenberg, Texas, VII, 25, 1912, (H.; in area overgrown with coffee-bean), 1 ♂.

**Scudderia furcata furcata** Brunner (Pl. IX, figs. 1 and 2; pl. X, fig. 19.)  
 1878. *Sc[udder]ia furcata* Brunner, Monogr. Phaner., p. 239, fig. 72a. [Maine; Texas.]

1894. *Scudderia fasciata* Beutenmüller, Bull. Amer. Mus. Nat. Hist., vi, p. 251. [West Woodstock, Connecticut.]

Scudder has correctly recognized *fasciata* as a color variation of the present insect. Such color variations, having no specific or racial importance, we do not consider of sufficient value to receive name designation and we consequently place the name *fasciata* in the synonymy here.

Decided geographic variation within the species, close relationship to *S. paronae* and great similarity of females of the present insect and *S. cuneata* over a large area in the southeastern United States, make the treatment of *S. furcata* unusually complex.

The large series at present before us gives ample evidence that not only does a valid geographic race of the present species exist in Mexico, but that two other races are being evolved at the present time, one in the desert mountains of the southwestern United States and the other on the northern Pacific coast of that country.

The area of intergradation between *furcata furcata* and typical *f. furcifera* in the United States comprehends the Rio Grande plain in Texas, and atypical *f. furcifera* is found further west from the Pecos River in western Texas northward to the vicinity of Fort Collins, Colorado, and westward across the southern portions of Utah and Nevada to southern California. This latter material we term atypical *f. furcifera* since in the form of the male supra-anal plate closer affinity to that race than to *f. furcata* is shown, but the females have a heavier and larger ovipositor than typical females of either of the above races. It is this character and the somewhat different proportions of this material which we believe indicates the incipient formation of a geographic race. In the northward distribution of this type the ovipositor shows a gradual decrease in size.

The Pacific coast material from British Columbia to south-central California (Santa Clara County) is perfectly typical of *furcata furcata* except that in the males the supra-anal plate is very much more decidedly enlarged apically. No other differential characters exist in either sex and we do not consider this material worthy of racial distinction but we do feel that again evidence of another incipient geographic race is present.

It may be noted that the material of *f. furcifera* from near the Mexican line in the southwestern United States (Chisos Mountains, Texas; Chiricahua, Huachuca and Baboquivari Mountains, Arizona and Los Angeles, California), though atypical, approaches that race more closely than does any other material from the United States, but as stated above the ovipositor is heavier and larger and besides the insects are usually large. Referring to *S. paronae* it may be seen that, although typically quite distinct from typical *f. furcifera*, Mexican material of *paronae* closely resembles the material here being discussed, as it is very much like typical *f. furcifera* but larger and having in the females a longer (but in this case proportionately shallower) ovipositor. The characters separating typical material of the races of this species and its nearest ally, *S. paronae*, are given in the key.

This insect varies geographically in size as follows, the tegminal length in males being given here, as it is approximately the best dimensions for showing such variation since very little tegminal variation in abbreviation or production is present in

this species. In New England the species is small (average about 28), in southward distribution along the Atlantic coast a moderate increase in size is found (average on Georgia coast about 31). In the latitude of New England little variation in size is found westward to the edge of the Great Plains, in southward distribution in the middle west an even greater increase in size is found from southern Kansas to northern Texas (average about 32) than on the Atlantic coast. From Georgia westward to the area of intergradation with *f. furcifera* scarcely any variation is to be found but the intermediate material is very slightly smaller (average about 29). West of these regions the species is almost wholly confined to the mountains and has been found from western Idaho to British Columbia and southward to south-central California; material from these regions is somewhat aberrant, slightly more robust than is usual in eastern material and not large (average about 29 mm.).

The length of the ovipositor by the greatest breadth of the same in females from the following localities is as follows. Marion, Massachusetts, 6.3 by 1.9 to 6.7 by 2; Saunderstown, Rhode Island, 6 by 2 to 6.1 by 1.8; Chestnut Hill, Pennsylvania, 6.2 by 1.8 to 6.4 by 2; Washington, District of Columbia, 6 by 2 and 6.2 by 1.8; Isle of Hope, Georgia, 6.8 by 2 to 6.9 by 2.1; Thomasville, Georgia, 7 by 2; St. Louis, Missouri, 6.5 by 2 to 6.7 by 1.9; Dallas, Texas, 7.3 by 2.1; Weatherford, Texas, 7.1 by 2.2; Beaumont, Texas, 6.2 by 2; Pullman, Washington, 6.5 by 2.1 to 6.7 by 2; Santa Clara Co., California, 6.9 by 2.1. Intermediate material between *f. furcata* and *f. furcifera*, Brownsville, Texas, 6.1 by 2.1 to 6.7 by 2.

Though normally uniform green in general coloration a number of specimens in the large series before us are more or less suffused with brown and in a single specimen the general coloration is russet marked with much darker brown. Only occasional specimens of the present species have the lateral angles of the pronotum outlined in yellowish. Nymphs of the species are frequently highly colored with strongly annulate antennae.

The present species appears in New Jersey (and probably in other regions as well) over a month later in the season than *S. curvicauda*. The present insect is somewhat more common than

that species in the pine barrens but does not reach the adult condition until after the middle of August.

Typical *S. furcata* is known from Brunswick, Maine south to Lakeland, Florida; around the Gulf coast to the vicinity of Corpus Christi, Texas, thence northward to Uvalde and Sweetwater, Texas; Glen, Nebraska, and Hot Springs, South Dakota. Other northernmost records are Cranmoor, Wisconsin; North Bay, Ontario and Montreal, Quebec. The distribution of the slightly atypical form found on the Pacific Coast and the area of intergradation with *S. f. furcifera* is discussed above.

*Specimens Examined*: 308; 171 males, 124 females, 10 immature males and 3 immature females. Atypical: 26; 14 males, 11 females, 1 immature female. Intermediates: 63; 37 males, 25 females, 1 immature female.

Seabrook, New Hampshire, (A. A. Eaton), 1 ♂, [U. S. N. M.].

Jaffrey, New Hampshire, IX, 14, 1896, (S. Henshaw), 2 ♀, [M. C. Z.].

Berkshire County, Massachusetts, 1887, 1 ♂, [Hebard Cln.].

Marion, Massachusetts, VIII to IX, 1905, (H.), 3 ♂, 3 ♀.

Saunderstown, Rhode Island, IX, 3 to 9, 1913, (H.; very common in clumps of bayberry growing along shore), 12 ♂, 9 ♀, 2 ♂ n., 1 ♀ n.

Wesquage Beach, Rhode Island, IX, 8, 10, 1913, (H.; few in bushes along beach dunes), 2 ♂, 1 ♀.

Lake Mahopae, New York, (T. D. O'Connor), 1 ♂, [Hebard Cln.].

Nyack, New York, (Zabriskie), 1 ♀, [U. S. N. M.].

Lakehurst, New Jersey, IX, 30, 1906, 1 ♀, [Hebard Cln.].

Woodbury, New Jersey, X, 2, 1907, (C. B. Hardenberg), 1 ♀, [A. N. S. P.].

Manahawkin, New Jersey, IX, 8, 1906, (B. Long), 2 ♂, [A. N. S. P.].

West Creek, New Jersey, VIII, 28, 1914, (R.; in pine barrens), 2 ♂.

Stafford's Forge, New Jersey, VIII, 12 to IX, 5, 1907, 1908, 1914, (R.; in pine barrens), 9 ♂, 6 ♀.

Eagleswood Bog, Ocean County, New Jersey, VIII, 28, 1914, (R.; in pine barrens), 1 ♀.

Margate City, New Jersey, VIII, 17, 1914, (H.; in barren dune forest), 2 ♂ n.

Reega, New Jersey, VII, 31 to VIII, 29, 1914, (H.; in pine barrens), 1 ♂, 5 ♂ n., 1 ♀ n.

Formosa Bogs, Cape May County, New Jersey, IX, 9, 1908, (H. Fox), 1 ♀, [A. N. S. P.].

Swainton, New Jersey, VIII, 21, 1914, (H.; undergrowth in pine woods), 1 ♂, 1 ♂ n.

Pittsburg, Pennsylvania, 1 ♀, [Pa. St. Dept. Zool.].

Beatty, Pennsylvania, (Brugger), 1 ♂, [A. N. S. P.].

Sulphur Springs, Pennsylvania, 1 ♂, [U. S. N. M.].

South Sterling, Pennsylvania, IX, 17, 1906, (B. Long), 1 ♂, 1 ♀, [A. N. S. P.].

Tobyhanna, Pennsylvania, IX, 1903, (H.; in burning, overgrown with low bushes), 1 ♂.

Newport, Pennsylvania, VIII, 8, 1 ♂, [Pa. St. Dept. Zool.].

Catawissa, Pennsylvania, IX, 4, 1 ♀, [Pa. St. Dept. Zool.].

Harrisburg, Pennsylvania, VIII, 6 to IX, 8, 4 ♂, 2 ♀, [Pa. St. Dept. Zool.].

Dauphin, Pennsylvania, IX, 15 to X, 3, 2 ♂, 1 ♀, [Pa. St. Dept. Zool.].

Marysville, Pennsylvania, VIII, 15, 1909, 1 ♀, [Pa. St. Dept. Zool.].

Camphill, Cumberland County, Pennsylvania, VIII, 18 to IX, 29, 2 ♂, 4 ♀, [Pa. St. Dept. Zool.].

Paxtang, Pennsylvania, X, 1, 1 ♀, [Pa. St. Dept. Zool.].

Orrtanna, Pennsylvania, IX, 4, 1 ♀, [Pa. St. Dept. Zool.].

Fites Eddy, Pennsylvania, 1 ♂, [A. N. S. P.].

Honesdale, Pennsylvania, IX, 25, 1 ♂, [Pa. St. Dept. Zool.].

Cornwells, Pennsylvania, IX, 7, 1914, (H.; edge of river in plants and vines), 1 ♂, 1 ♀.

Edgehill, Pennsylvania, IX, 25, 1906, (B. Long), 1 ♀, [A. N. S. P.].

Chestnut Hill, Pennsylvania, IX, 13, 1903, (H.; low bushes, sweet fern, etc.), 2 ♂, 2 ♀.

Castle Rock, Delaware County, Pennsylvania, IX, 19, 1909, (R. & H.; undergrowth of deciduous forest), 2 ♂.

Tinicum Island, Pennsylvania, IX, 9, 1904, (R. & H.), 1 ♂.

Swarthmore, Pennsylvania, VIII, 22, 1899, (R.), 1 ♂, 1 ♀, [A. N. S. P.].

Collingdale, Pennsylvania, VIII, 24, 1899, (R.), 1 ♂, 1 ♀, [A. N. S. P.].

Chestertown, Maryland, VIII, 26, 1909, (E. G. Vanatta), 2 ♂, [A. N. S. P.].

Cabin John, Maryland, IX, 2, 1907, (F. Knab), 1 ♂, [U. S. N. M.].

Plummers Island, Maryland, VIII, 29 to X, 11, 1906 to 1912, (Caudell, Fisher), 4 ♂, 10 ♀, [U. S. N. M.].

Washington, District of Columbia, VIII, 1883, 3 ♂, 2 ♀, [Hebard Cln.].

Pimmit Run, Virginia, IX, 6, 1908, (F. Knab), 1 ♀, [U. S. N. M.].

Peaks of Otter, Virginia, (Wm. Palmer), 1 ♀, [U. S. N. M.].

Linville, North Carolina, VIII, 30, 1903, (Morse), 3 ♂, 1 ♀, [Morse Cln.].

Topton, North Carolina, VIII, 21, 1903, (Morse), 3 ♂, 1 ♀, [Morse Cln.].

Governor Island, North Carolina, VIII, 20, 1903, (Morse), 1 ♀, [Morse Cln.].

Fayetteville, North Carolina, IX, 9, 1911, (R. & H.; common in short-leaf pine undergrowth), 4 ♂.

Wrightsville, North Carolina, IX, 7, 1911, (R. & H.), 1 ♀.

Lake Waccamaw, North Carolina, IX, 8, 1911, (R. & H.), 3 ♂, 1 ♀.

Tryon, North Carolina, (H. A. Dyar), 1 ♂, [U. S. N. M.].

Highlands, North Carolina, IX, 1906, (F. Sherman, Jr.), 1 ♂, [U. S. N. M.].

Yemassee, South Carolina, IX, 4, 1911, (R. & H.), 2 ♂.

Sand Mountain, Georgia, VIII, 25, 1903, (Morse), 1 ♂, [Morse Cln.].

Rome, Georgia, VIII, 21, 1910, 1 ♂, [Ga. State Cln.].

Stone Mountain, Georgia, IX, 12, 1913, (J. C. Bradley), 1 ♀.



Isle of Hope, Georgia, IX, 3, 1911, (R. & H.; heavy undergrowth of green plants and vines in gray-bark pine forest), 2 ♂, 1 ♀.

Albany, Georgia, VIII, 1, 1913, (R. & H.; heavy undergrowth in long-leaf pine woods near river), 1 ♀.

Spring Creek, Georgia, (J. C. Bradley), 2 ♂, [Ga. State Cln.].

Jacksonville, Florida, IX, 6, 7, 1913, (W. T. Davis), 2 ♂, 1 ♀, [Davis Cln.].

Detroit, Michigan, IX, 1 ♂, [U. S. N. M.].

West Spring Green, Wisconsin, (C. W. Hooker), VIII, 13, 1906, 1 ♂, [Pa. St. Dept. Zool.].

Cranmoor, Wisconsin, IX, 18 to 21, 1909, (C. W. Hooker), 1 ♂, 1 ♀, [U. S. N. M.].

Columbus, Ohio, (C. M. Weed), 1 ♂, [Hebard Cln.].

Wyandotte, Indiana, VIII, 1905, (Caudell), 1 ♀, [U. S. N. M.].

St. Louis, Missouri, IX, 25 to X, 22, 1904, (C. L. Heink), 3 ♂, 3 ♀, [Hebard Cln.].

Pineville, Kentucky, 1 ♂, [Hebard Cln.].

Roan Mountain Station, Tennessee, VIII, 31 to IX, 3, 1903, (Morse), 2 ♂, 1 ♀, [Morse Cln.].

Morristown, Tennessee, VIII, 27, 1903, (Morse), 1 ♂, 2 ♀, [Morse Cln.].

Lookout Mountain, Tennessee, VIII, 23, 1903, (Morse), 1 ♂, [Morse Cln.].

Clarksville, Tennessee, IX, 19, 1910, (on tobacco), 1 ♀, [U. S. N. M.].

Selma, Alabama, IX, 11, (eating cotton leaves), 1 ♂, [U. S. N. M.].

Homer, Louisiana, XI, 8, 1907, (F. C. Pratt), 1 ♀, [U. S. N. M.].

Baton Rouge, Louisiana, XII, 12, 1899, 1 ♀, [U. S. N. M.].

Hot Springs, South Dakota, X, 1888, 1 ♂, 1 ♀, [Hebard Cln.].

Glen, Sioux County, Nebraska, VIII, 6 to 20, 1903, (L. Bruner), 1 ♂, 1 ♀, [Hebard Cln.].

Weeping Water, Nebraska, IX, 1909, (L. Bruner), 1 ♂, [Hebard Cln.].

Lincoln, Nebraska, IX, 4, 1893, (L. Bruner), 3 ♀, [Hebard Cln.].

Douglas County, Kansas, IX, 1 ♂, [A. N. S. P.].

Barber County, Kansas, (F. W. Cragin), 1 ♂,<sup>20</sup> [Hebard Cln.].

Independence, Kansas, VIII to IX, 1902, (A. Birekfield), 1 ♂, 2 ♀, [U. S. N. M.].

Fayetteville, Arkansas, IX, 5, 1905, (Morse), 5 ♂, 2 ♀, [Morse Cln.].

Winslow, Arkansas, IX, 2 to 4, 1905, (Morse), 8 ♂, 3 ♀, [Morse Cln.].

Van Buren, Arkansas, IX, 1, 1905, (Morse), 4 ♂, 1 ♀, [Morse Cln.].

Magazine Mountain, Arkansas, 2600 feet, VIII, 29, 1905, (Morse), 1 ♀, [Morse Cln.].

Blue Mountain Station, Arkansas, VIII, 28, 1905, (Morse), 1 ♂, 1 ♀, [Morse Cln.].

Dardanelle, Arkansas, VIII, 31, 1905, (Morse), 1 ♂, [Morse Cln.].

<sup>20</sup> This specimen is referred by Bruner to the present species with a question, Bull. Washb. Coll., i, p. 127, (1885). Material of the present species has been frequently recorded as *S. furculata*, which name is correctly a synonym of *S. mexicana* as established by Scudder.



- Ola, Arkansas, VIII, 30, 1905, (Morse), 2 ♂, [Morse Cln.].  
 Little Rock, Arkansas, IX, 17, 1910, (E. S. Tucker), 1 ♀, [U. S. N. M.].  
 Haileyville, Oklahoma, VIII, 6, 1905, (Morse), 1 ♂, [Morse Cln.].  
 Wilburton, Oklahoma, VIII, 27, 1905, (Morse), 1 ♂, [Morse Cln.].  
 South McAlester, Oklahoma, VIII, 7, 1905, (Morse), 2 ♂, [Morse Cln.].  
 Wewoka, Oklahoma, VIII, 27, 1905, (Morse), 1 ♀, [Morse Cln.].  
 Shawnee, Oklahoma, VIII, 26, 1905, (Morse), 5 ♂, 4 ♀, [Morse Cln.].  
 Mount Sheridan summit, Oklahoma, = 2600 feet, VIII, 24, 1905, (Morse),  
 1 ♀, [Morse Cln.].  
 Mount Sheridan base, Oklahoma, VIII, 24, 1905, (Morse), 1 ♂, 3 ♀, [Morse  
 Cln.].  
 Cache, Oklahoma, VIII, 23, 1905, (Morse), 2 ♀, [Morse Cln.].  
 Caddo, Oklahoma, VIII, 9, 1905, (Morse), 1 ♂, 1 ♀, [Morse Cln.].  
 Paris, Texas, VIII, 21, 1904, (F. C. Bishopp), 1 ♂, [U. S. N. M.].  
 Denison, Texas, VIII, 11, 1905, (Morse), 1 ♂, 1 ♀, [Morse Cln.].  
 Wichita Falls, Texas, VIII, 16, 1905, (Morse), 1 ♂, 2 ♀, [Morse Cln.].  
 Sweetwater, Texas, IX, 20, 1912, (R. & H.; in burdock and high weeds  
 in depressions), 1 ♂, 1 ♀.  
 Weatherford, Texas, IX, 23, 1912, (R. & H.; common in weeds especially  
 about oak groves and on oaks), 6 ♂, 1 ♀.  
 Sagamore Hill, Texas, IX, 27, 1912, (R. & H.; moderately common in  
 oaks), 3 ♂, 3 ♀.  
 Dallas, Texas, IX, 25, 26, 1912, (R. & H.; locally common in weeds, oaks  
 and mesquite), 5♂, 1 ♀; IX, 10 and 15, 1908 and 1909, (E. S. Tucker, on  
 blossoms of *Polygonum* sp.; F.C. Bishopp, on sycamore), 2 ♀, [U. S. N. M.].  
 Mineola, Texas, X, 1, 1906, (F. C. Bishopp), 1 ♂, [U. S. N. M.].  
 Shovel Mount, Texas, VII, 10 to X, 4, 1901, (F. G. Schaupp), 2 ♂, 1 ♀,  
 [A. N. S. P.].  
 Temple, Texas, IX, 24, 1912, (R. & H.; in weeds along stream border),  
 1 ♂, 2 ♀.  
 Calvert, Texas, (G. H. Harris), 1 ♂, [U. S. N. M.].  
 Columbus, Texas, 1 ♂, [U. S. N. M.].  
 San Antonio, Texas, VIII, 16, 1912, (R. & H.; near water hole in tall  
 nettles and weeds), 1 ♂.  
 Doucette, Texas, VII, 24, 1912, (H.), 1 ♀.  
 Beaumont, Texas, VII, 23, 1912, (H.; on swampy ground in mainly de-  
 ciduous forest), 1 ♂, 2 ♀.  
 Dickinson, Texas, VII, 20, 1912, (H.; in green plant on edge of stream  
 in pine woods), 1 ♂.  
 Uvalde, Texas, VIII, 21 to 22, 1912, (R. & H.), 1 ♀.  
*S. furcata* showing atypical tendencies.  
 Evergreen, Washington County, Idaho, VIII, 12, 1910, (R. & H.; in dry  
 wild rose bushes in forest of bull pine), 1 ♀.  
 Diamond Springs, Washington County, Idaho, VIII, 13, 1910, 3000 feet,  
 (R. & H.), 1 ♀.  
 Pullman, Washington, (C. V. Piper), 4 ♀, [U. S. N. M. and Hebard  
 Cln.].

- Olympia, Washington, VI, 17, 1897, 1 ♀, [U. S. N. M.].  
 Council Crest, Portland, Oregon, VIII, 9, 1909, (H.), 1 ♀ n.  
 Shasta County, California, 1885, (J. Behrens), 5 ♂, 1 ♀,<sup>21</sup> [Hebard Cln.].  
 Mount Shasta, California, VIII, 14, 1909, 4500 feet, (R.; in open chaparral), 1 ♂.  
 Tehama, California, VIII, 16, 1909, (H.; in weedy field), 1 ♂.  
 Colfax, California, VIII, 27, 1910, 2450-2800 feet, (R. & H.), 1 ♂.  
 Marble Valley, Eldorado County, California, VII, 15, 1885, (in grape vines), 1 ♀ [U. S. N. M.].  
 Menlo Park, California, I, 1905, (F. Hornung), 1 ♂, [U. S. N. M.].  
 Santa Clara County, California, IV, 1902, (Coleman), 1 ♀, [Hebard Cln.].  
 Visalia, California, (Culbertson), 1 ♂, [A. N. S. P.].  
 Lindsay, California, VI, 4 to VIII, 25, 1898 to 1911, (J. R. Horton and C. E. Pemberton; on orange trees), 4 ♂, 1 ♀, [U. S. N. M.].  
 Intermediates between *S. f. furcata* and *S. f. furcifera*.  
 San Diego, Texas, V, 27, (E. A. Schwarz), 1 ♂, 1 ♀, [U. S. N. M.].  
 Benavides, Texas, VIII, 9, 10, 1912, (R. & H.), 2 ♀.  
 Laredo, Texas, XI, 24, 1905, (F. C. Pratt), 1 ♀, [U. S. N. M.].  
 Lyford, Texas, VIII, 6, 7, 1912, (R. & H.), 7 ♂, 7 ♀, 1 ♀ n.  
 Laguna del Gato, Hidalgo County, Texas, VIII, 6, 1912, (R. & H.), 1 ♂.  
 Brownsville, Texas, VII, 31 to VIII, 5, 1912, (R. & H.; common in vegetation along river and very plentiful at night about lights in town), 26 ♂, 12 ♀.  
 Piper Plantation near Brownsville, Texas, VIII, 3, 1912, (R. & H.; in heavy jungle), 2 ♂.  
 Point Isabel, Texas, VIII, 2, 1912, (H.), 1 ♀.  
 Matamoros, Tamaulipas, Mexico, VIII, 1, 1912, (H.), 1 ♀.

***Scudderia furcata furcifera* Scudder (Pl. X, fig. 20.)**

1898. *Scudderia furcifera* Scudder, Proc. Amer. Acad. Arts and Sci., xxxiii, p. 282, fig. 7. (In part.) [Medellin and Venis Mecas, Mexico.]

1903. *Spilacris maculatus* Rehn and Cockerell, Proc. Acad. Nat. Sci. Phila., 1903, p. 630. [Pecos, New Mexico.]

1905. *Scudderia curvicauda* (not *Locusta curvicauda* DeGeer, 1773) Rehn in Baker, Inv. Pac., Orth., ii, p. 78. [San Marcos, Nicaragua.]

1906. *Scudderia furcata* Rehn, Ent. News, xvii, p. 288. [Beaver City, Utah.]

1906. *Scudderia furcata* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1906, p. 415. [Manitou, Colorado.]

We here select a male as single type and a female as allotype, which specimens were taken by the Rev. T. Heyde at Medellin,

<sup>21</sup> This series was referred to by Bruner as belonging to a new species, Bull. Washb. Coll., i, p. 127, (1885), as his labels on the specimens indicate. They are all of the usual somewhat aberrant type found in that region which we have discussed under the present form, but further characters to separate them from *S. furcata furcata* are wanting.

Vera Cruz, Mexico, and are in the Hebard Collection ex Bruner. Unfortunately a series of dried alcoholic specimens of the closely related *S. paronae* from Tepic, Mexico, was confused with this insect by Scudder and included in his type series.

Rehn and Cockerell's *Spilaeris maculatus* was based upon a specimen in one of the earlier stages of development, determinable as an atypical example of the present race from the fact that it is very brilliantly colored with annulate antennae (as found in the early stages of *furcata* alone of the northern species), and was taken in a region where this race alone represents the genus.

The relationship of this geographic race to *S. furcata furcata* and to *paronae* is discussed under *f. furcata*. The intergradation between the present race and *f. furcata* is also discussed there, and the atypical development of the race in the mountain regions of the southwestern United States is commented upon.

*Measurements (in millimeters) of extremes*

*S. furcata furcifera* showing atypical tendencies

♂	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur
Sycamore Canyon, Arizona.....(2)	6-6.2	34.8-35	6.9-7.1	25.9-26.8
Carr Canyon, Arizona.....(4)	5.8-6	34.7-36.2	7-7.3	24.3-25.9
Jemez Hot Springs, N. M.....(1)	5.8	32	6.7	24
Manitou, Colorado.....(2)	5.3-5.7	32.6-33.4	7-7.1	23.1-23.3
Denver, Colorado.....(1)	5.4	34.6	7.2	24
♀	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur
Sycamore Canyon, Arizona.....(1)	5.6	32.2	6.8	25.1
Carr Canyon, Arizona.....(8)	5.7-5.8	34-34.8	6.8-7.2	25-25.3
Jemez Hot Springs, N. M.....(1)	5	30	6.3	22.4
Beulah, New Mexico.....(1)	5.1	33	6.8	22.8
Manitou, Colorado.....(3)	5.4-5.6	31-31.3	6.8-6.9	22.9-23.2
Lost Mine Peak, Texas.....(1)	5.9	31.6	6.7	25

*S. furcata furcifera* typical material

♂	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur
Medellin, Vera Cruz, Mexico. <i>Type</i>	5	29	6.6	23.7
Medellin, Vera Cruz, Mexico....(4)	4.8-5.4	29-29.7	6.4-7	22.8-23.7
Vera Cruz, Vera Cruz, Mexico..(1)	5.1	30	6.7	23.7
Orizaba, Vera Cruz, Mexico....(2)	4.8-5	29.4-30.7	6.7-6.8	21.6-22

*S. furcata furcifera* typical material

♀	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur
Medellin, Vera Cruz, Mex. <i>Allotype</i>	5.1	31.1	6.7	25
Medellin, Vera Cruz, Mexico... (2)	5.1-5.3	30.7-31.2	6.6-6.7	24.4-25.3
Vera Cruz, Vera Cruz, Mexico... (2)	5.1-5.3	30.2-31	6.3-7	24.2-25.1
Orizaba, Vera Cruz, Mexico.... (5)	4.9-5.1	29.5-31	6.4-6.9	22.6-23.6

The length by the greatest breadth of the ovipositor in females from a number of localities is as follows. Atypical *f. furcifera*. Lost Mine Peak, Texas, 7.7 by 2.6; Sycamore Canyon, Arizona, 7.3 by 2.4 mm.; Hot Springs, New Mexico, 7 by 2.4; Jemez Hot Springs, New Mexico, 6.7 by 2.3; Caliente, Nevada, 7.1 by 2.3; Manitou, Colorado, 6.6 to 7 by 2.3 to 2.4. Typical *f. furcifera*. Medellin, Mexico, 6.2 to 6.4 by 1.8 to 1.9; Vera Cruz, Mexico, 6.7 to 7 by 1.8 to 1.9; Orizaba, Mexico, 6.3 to 6.7 by 1.8 to 1.9 mm.

Typical material of the present geographic race is known only from San Marcos, Nicaragua; Cacao Trece Aguas, Guatemala; Merida, Yucatan; Rincon Antonio, Oaxaca, and a number of localities in the state of Vera Cruz, Mexico. The distribution in Mexico of the atypical form found in the southwestern United States is entirely unknown.

*Specimens Examined*: 26; 11 males and 15 females. Atypical: 16; 7 males, 8 females and 1 immature female.

Cacao Trece Aguas, Alta Vera Paz, Guatemala, 900 feet, (Barber), 1 ♂, [U. S. N. M.].

Merida, Yucatan, Mexico, (Gaumer), 1 ♂, [Hebard Cln.].

Rincon Antonio, Oaxaca, Mexico, VI, 25, 1905, (F. Knab), 1 ♀, [U. S. N. M.].

Vera Cruz, Vera Cruz, Mexico, (T. Heyde), 1 ♂, 2 ♀, [Hebard Cln.].

San Rafael, Vera Cruz, Mexico, (Townsend), 1 ♂, [Hebard Cln.].

Medellin, Vera Cruz, Mexico, (T. Heyde), 5 ♂, 3 ♀, *type* and *allotype*, [Hebard Cln.].

Atoyac, Vera Cruz, Mexico, XII, 1887, (L. Bruner), 2 ♀, [Hebard Cln.].

Cordoba, Vera Cruz, Mexico, VI, 6, 1905, (F. Knab), 2 ♀, [U. S. N. M.].

Orizaba, Vera Cruz, Mexico, XI, 1887, (L. Bruner), 2 ♂, 5 ♀, [Hebard Cln.].

*S. furcata furcifera* showing atypical tendencies.

Lost Mine Peak, Chisos Mountains, Texas, IX, 6, 1912, 5800 feet, (R. & II.), 1 ♀.

Fort Wingate, New Mexico, VIII, 18, 1910, (J. Woodgate), 1 ♀, [Hebard Cln.].

Las Vegas, New Mexico, VIII, 8, (Barber and Schwarz), 2 ♂, [U. S. N. M.].

Hot Springs, New Mexico, 7000 feet, 2 ♀, [Hebard Cln.].

Jemez Hot Springs, New Mexico, VIII, 6, 1911, (J. Woodgate), 1 ♀ n.; IX, 23, 30, 1912, (J. Woodgate), 1 ♂, 1 ♀, [Hebard Cln.].

Beulah, New Mexico, VIII, 17, (H. Skinner), 1 ♂, [A. N. S. P.].

Glenwood Springs, Colorado, IX, 9, 1909, 6000 feet, (R. & H.; in low herbage under junipers on mountain slopes), 1 ♂.

Denver, Colorado, (Beale), 1 ♂, [Hebard Cln.].

Fort Collins, Colorado, VIII, 1898, 1 ♀, 1 ♀ n., [U. S. N. M.].

Chiricahua Mountains, Arizona, VIII, 10, 1907, 8000 feet, (J. L. Webb), 1 ♀, [U. S. N. M.].

Huachuca Mountains, Arizona, VIII, 18, 1903, (Osler), 1 ♀, [U. S. N. M.].

Sycamore Canyon, Baboquivari Mountains, Arizona, X, 6 to 9, 1910, 4700 feet, (R. & H.; in grasses on hillsides), 2 ♂, 1 ♀.

Grand Canyon of the Colorado, Arizona, VII, 11, 1892, 1 ♀, [Hebard Cln.].

Caliente, Nevada, IX, 3, 1909, 4600 feet, (R. & H.; on mountain side covered with scattered growth of sage and other bushes), 1 ♀.

Los Angeles, California, 1 ♂, [Hebard Cln.].

### **Scudderia paronae** Griffini

1896. *Scudderia paronae* Griffini, Boll. Mus. Zool. Univ. Torino, xi, No. 232, p. 11. [Colon, Panama.]

1897. *Scudderia curvicauda* Saussure and Pictet (not *Locusta curvicauda* DeGeer, 1773), Biol. Cent.-Amer., Orth., i, p. 331, pl. xv, fig. 20. [Orizaba and Atoyac, Vera Cruz, Mexico; Teapa, Tabasco, Mexico.]

1898. *Scudderia mexicana* Scudder, Proc. Amer. Acad. Arts and Sci., xxxiii, p. 280. (In part.) [Orizaba, Mexico.]

1898. *Scudderia furcifera* Scudder, Proc. Amer. Acad. Arts and Sci., xxxiii, p. 283. (In part.) [Tepic, Mexico.]

Scudder carelessly included the two males before him from Orizaba in his series of *S. mexicana* and confused his series of the present insect from Tepic, Mexico, with the closely related *S. f. furcifera*, this latter error due to the fact that he had never seen typical *paronae* and that the material from Tepic is dried alcoholic.

Typical *paronae* differs from *f. furcifera* in the somewhat larger size, slightly more prominent eyes, and antennae which are marked with broad and widely spaced pale annuli; the males have very similar genitalia but the females have a longer but proportionately slenderer ovipositor.

*Allotype* here selected: ♀; Ancon, Canal Zone Panama. November 16, 1913. (M. Hebard.) [Hebard Collection.]

*Description of Allotype*.—Similar to the male type as described by Griffini, the following characters being worthy of emphasis. Antennae at base of the general green coloration for a distance of nearly 4 mm., distad paler,

then brown for 3.4 mm., followed by a greenish white annulus 1.1 mm. in length, again brown for 7.1 mm., and with an annulus of similar coloration 1.9 mm. in length, then brown for 10 mm., with a similar annulus 1.1 mm. in length distad of this brown.<sup>22</sup> Dorsum of pronotum rounding sharply into lateral lobes without decided lateral angles, except caudad at the humeral sinus. Ovipositor long and rather slender, curved and but weakly bent.

Although the only large series before us (Tepic) exhibits a very great amount of individual variation, the following measurements show that in the present species an increase in size takes place in its northward distribution. The females from Tepic average near the maximum measurements given below.

*Measurements (in millimeters)*

♂	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of subgenital plate
Ancon, Panama.... <sup>23</sup> (1)	5.4	30.7	6.6	25.4	5.5
Guatel, Costa Rica..(2)	5.2-5.4	30.1-31.3	6.2-7	23.6-24.9	5-5.3
Tepic, Mexico.....(1)	5.7	32.8	7	24.8	5.7
♀	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length by width of ovipositor
Ancon, Panama. <i>Allo-</i>					
<i>type</i> .....	5.3	30	6.3	26	7 by 1.9
Guatel, Costa Rica..(1)	5.3	33.3	6.3	24.8	7.1 by 1.8
Atoyac, Mexico....(1)	5.7	33	7.2	27.7	7.3 by 2
Orizaba, Mexico....(1)	5.8	34.8	7	27.4	7.3 by 2
Tepic, Mexico.....(11)	5.3-6.7	31.3-37.6	6.4-7	25.2-31.2	6.1 by 1.6 to 7.2 by 1.9

In the present species the annuli of the antennae, so striking in typical material from Panama, appear to decrease rapidly in intensity in the northward distribution of the species. The specimens from Costa Rica have these annuli weakly indicated, while those from the state of Vera Cruz have them obsolete. This condition may be considerably emphasized in the material before us through these latter specimens being but indifferently

<sup>22</sup> The male before us from Ancon has the antennae similarly marked.

<sup>23</sup> The type is somewhat smaller than this male.



preserved. In the Tepic series, which is dried alcoholic, practically all coloration is lost and only a few specimens show faint traces of antennal annuli.

The present species is known to range from Colon and Ancon, Panama, northward to Orizaba, Cuernavaca and Tepic, Mexico.

*Specimens Examined*: 24; 6 males, 15 females; 1 immature male and 2 immature females.

Culebra, Canal Zone, Panama, 1910, (H. H. Rousseau), 1 ♂, 1 ♂ n., 1 ♀ n., [U. S. N. M.].

Ancon, Canal Zone, Panama, XI, 16, 1913, (H.; in marshy spot at foot of hill in tall grasses), 1 ♂, 1 ♀. *Allotype*.

Guatel, Costa Rica, IV, 20 to 22, 1902, 2 ♂, 1 ♀, [Hebard Cln.].

Zacapa, Guatemala, I, 22, 1905, (C. C. Deam), 1 ♀ n., [U. S. N. M.].

Cuernavaca, Morelos, Mexico, (W. L. Tower), 1 ♂, [Am. Mus. Nat. Hist.].

Atoyac, Vera Cruz, Mexico, XII, 1887, (L. Bruner), 1 ♀, [Hebard Cln.].

Orizaba, Vera Cruz, Mexico, XI, 1887, (L. Bruner), 1 ♀, [Hebard Cln.].

Tepic, Tepic, Mexico, 1 ♂, 11 ♀, [Hebard Cln.].

### **Scudderia ungulata** Scudder

1898. *Scudderia ungulata* Scudder, Proc. Amer. Acad. Arts and Sci., xxxiii, p. 280, fig. 6. [Tepic; Mexico.]

The present species is one of the largest and most robust of the genus. The males are readily separable from other species by the characters of the production of the supra-anal plate, in which relationship to *S. mexicana* is shown, but in the present insect this plate is much more simple. The females are distinguished by having much the largest ovipositor of any species of the genus, with the apex of the same much less rounded. This ovipositor is gently curved and not at all bent, a condition found elsewhere in the genus only in the apparently more primitive species *S. septentrionalis* and *S. hemidactyla*.

We here select as single type the female described by Scudder from Tepic, Mexico, and now in the Hebard Collection. The described male is consequently the allotype; it is in the same collection.

All of the material from Tepic is dried alcoholic but the series of seven specimens (six in A. N. S. P.) from Guadalajara shows the normal coloring of the species of the genus with lateral angles of the pronotum immaculate and both tegmina and antennae unicolorous, green and brown respectively.

Scudder's discussion as to the relationship of this species to *S. paronae* was due to the fact that at that time the female of that species was unknown in the literature, he had never recognized male specimens of that insect and the alcoholic condition of his types of the present species was confusing. The two species are very widely separated.

The median compressed lamina dependent between the cerci had been destroyed by pests in the male specimen described by Scudder (allotype), in the other males before us this part is quite as in the other species of the genus.

*Measurements (in millimeters) of extremes*

♂	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of subgenital plate
Tepic, Mexico <i>Allotype</i> ...	6.2	37.6	7.8	28.4	8
Tepic, Mexico.....(1)	6.1	37.8	7.8		8 1
Guadalajara, Mexico...(4)	6-6.3	35.6-38.2	7.4-7.9	28.8-29.6	7.7-8
♀	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of ovipositor
Tepic, Mexico <i>Type</i> .....	6.1	35.6	7.2	27.7	10.7
Tepic, Mexico.....(4)	6-6.2	34.7-36.8	7-8	28.7-29.4	10.7-11.4
Guadalajara, Mexico...(3)	5.9-6.1	33.4-34.8	6.8-7.1	29.1-29.4	10.6-10.8

The ovipositor in the type has the proximal width 2.8 and the mesal width 2.4 mm., in the other females the proximal width of the ovipositor is 2.8 and the mesal width 2.4 to 2.6 mm.

The above measurements for material from Tepic, and those given for the described pair by Scudder, are as nearly correct as can be taken from dried alcoholic material. Scudder's ovipositor length is less than ours, as he measured from the dorsal margin of the base to the apex of the ovipositor, while our measurements are all taken from the ventral apex of the basal plica to the apex of the ovipositor.

The present striking species is known as yet only from Guadalajara, Jalisco, and Tepic, Mexico.

*Specimens Examined:* 15; 4 males and 11 females.

Guadalajara, Jalisco, Mexico, IX, 13, 1903, 3500 feet, (W. L. Tower;

bottom of La Barranca), 1 ♀, [Am. Mus. Nat. Hist.]; (D. L. Crawford), 2 ♂, 5 ♀, [A. N. S. P.].

Tepic, Mexico, 2 ♂, 5 ♀, *type* and *allotype*, [Hebard Cln.].

**Scudderia cuneata** Morse (Pl. IX, fig. 3; pl. X, fig. 21.)

1901. *Scudderia cuneata* Morse, Can. Ent., xxxiii, p. 130. [Alabama.]

The form of the supra-anal plate in the male of the present species is distinctive but shows that the insect is related more closely to *S. mexicana* than to any other species, from which form it differs decidedly in size and general structure. In these latter respects the present species much more closely resembles *S. furcata*, and the material before us shows that although specimens of the present species from Florida are separable through somewhat larger size and heavier proportions, the insect becomes smaller and slightly less robust in its northward distribution. As the female genital characters are practically identical with those of *furcata*, and as the two species are of almost exactly the same size and proportions from North Carolina to Georgia and Alabama, where both are found from the Piedmont region to the coast, separation of that sex of the two species is there decidedly difficult. The eyes in *cuneata* appear to be very slightly more rotundate and prominent than in *furcata*, while other similarly almost intangible characters are to be found in the contour of the tegmina and in the ovipositor.

*Measurements (in millimeters) of extremes*

♂	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of subgenital plate
Fayetteville, N. C. .... (4)	4.7-5.2	27-30.8	5.3-5.7	25-25.7	5.9-6
Florence, S. C. .... (3)	5.1-5.2	30.7-32	5.8-5.9	26-28.2	6.4-6.6
Brunswick, Georgia ... (1)	5.3	30.9	5.8	26.7	6.3
Jacksonville, Florida ... (1)	5.7	33.1	6.6	28.8	6.9
Miami, Florida. .... (1)	6.7	34.2	6.9	29.2	7.1
♀	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of ovipositor
Fayetteville, N. C. .... (10)	4.9-5.2	27.5-28.3	5.6-5.9	23.1-26.1	6.4-6.7
Florence, S. C. .... (4)	4.8-5	28.7-28.9	5.8-5.9	26.1-27.8	6.3-6.7
Pablo Beach, Florida ... (1)	5.7	32.3	6.4	28.2	7.4
Miami, Florida. .... (1)	6.4	34.7	6.7	29.7	7.4

In general coloration the series before us is uniform green, many individuals have the lateral angles of the pronotum weakly outlined in yellowish.

Material from North and South Carolina has the least ovipositor width, ranging from 1.8 to 2 mm., in females from Florida this width is 2.2 (Pablo Beach) and 2.3 mm. (Miami).

The present species is known to range from Raleigh, North Carolina, south to Miami, Florida, and west to Alabama. It has been found to be a scarce but rather generally distributed species in the low country below the fall line in the region defined above.

*Specimens Examined*: 31; 15 males and 16 females.

Fayetteville, North Carolina, IX, 9, 1911, (R. & H.; common in short-leaf pine woods especially about scrub oaks) 4 ♂, 10 ♀.

Wrightsville, North Carolina, IX, 7, 1911, (R. & H.), 1 ♂.

Lake Waccamaw, North Carolina, IX, 8, 1911, (R. & H.), 1 ♂.

Florence, South Carolina, IX, 6, 1911, (R. & H.; in raspberry and other plants along "branch" in forest of gum, sweet gum, etc.), 3 ♂, 4 ♀.

Sandfly, Georgia, IX, 3, 1911, (R. & H.; heavy undergrowth of gray-bark pine forest), 2 ♂.

Brunswick, Georgia, VIII, 30, 1911, (H.; on palmetto flats), 1 ♂.

Billy's Island, Okefenokee Swamp, Georgia, VI to IX, 1912-13, (J. C. Bradley), 2 ♂, 2 ♀, [Cornell Univ.].

Jacksonville, Florida, IX, 7, 1913, (W. T. Davis), 1 ♂, [Davis Cln.].

**Scudderia mexicana** (Saussure) (Pl. IX, fig. 4; pl. X, fig. 28.)

1861. *Phaneroptera mexicana* Saussure, Rev. et Mag. Zool., 2e Ser., xiii, p. 129. [Mexico.]

1878. *Sc[udderia] furculata* Brunner, Monogr. Phaner., p. 239, fig. 72b. [Mexico; Texas.]

With the exception of the very aberrant *S. strigata*, the present insect is the most attenuate of the species of the present genus. The genital characters of the male of *mexicana* are very distinctive as given in the key. The species is very different from its nearest allies *S. cuneata* and *ungulata*.

*Measurements (in millimeters) of extremes*

♂	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of wing	Length of caudal femur	Length of subgenital plate
Pasadena, California....(1)	5.7	36.7	6.7	44.7	28.7	7
Santa Monica, California..(1)	5.7	37.3	6.4	44.5	28.4	7.3
Sycamore Canyon, Ariz... (3)	5.7-5.9	34.1-36.5	5.8-6.5	41.3-44.4	26.2-28.3	7-7.8
Cuernavaca, Mexico... (10)	5.4-6	31.4-36.1	6-6.6	37.1-44.4	23.8-25.7	5.9-7.3
♀	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of wing	Length of caudal femur	Length of ovipositor
Los Angeles Co., California..(1)	5.9	36	6.6	42.7	28.3	6.9
Tumamoc Hill, Arizona. ... (2)	5.4-5.7	31-33.9	6-6.2	38.1-39.7	25.4-26.1	6.4-6.7
Sycamore Canyon, Ariz... (2)	5.6-5.7	34.8-35.4	6.1-6.5	42.3-42.4	27.9-28.3	6.9-7
Cuernavaca, Mexico.....(8)	5.4-5.7	32.7-33.1	6.1-6.8	39.4-41.1	24.8-27	6.1-6.2

Normally uniform green in general coloration the series before us contains a few specimens which exhibit a more or less marked brownish suffusion. The lateral angles of the pronotum though usually immaculate are in a few specimens heavily outlined in yellowish.

The series before us from Cuernavaca shows that the variation in the present species is chiefly individual, the majority of specimens from that locality, however, approach the minimum measurements.

Intermediate material between *S. furcata furcata* and *S. f. furcifera* was found at Brownsville, Texas, by the authors, attracted to light at night in great numbers; the series before us of the present species from Cuernavaca shows that it responds similarly to lights at night.

In its northernmost distribution the present insect is found in the United States in the Chisos Mountains in Texas, in southeastern Arizona as far north as Fort Grant and on the California

coast to Pasadena.<sup>24</sup> In Mexico the species is widely distributed and is known from as far south as Guatemala.

*Specimens Examined:* 41; 24 males and 17 females.

Chisos Mountains, Texas, VI, 10 to 12, 1908, (J. D. Mitchell), 1 ♀, [U. S. N. M.].

Fort Grant, Arizona, 1882, 1 ♂, [U. S. N. M.].

Tumamoc Hill, Tucson Mountains, Arizona, X, 3 to 4, 1910, 2720 feet, (R. & H.; from yellow grass about culture frames at laboratory), 2 ♀.

Sycamore Canyon, Baboquivari Mountains, Arizona, X, 6 to 9, 1910, 3700 to 4700 feet, (R. & H.; scarce in grasses on hillsides), 3 ♂, 2 ♀.

Los Angeles County, California, (Coquillett), 3 ♂, 2 ♀, [U. S. N. M. and Hebard Cln.].

Coronado Beach, California, (Blaisdell), 2 ♂, [Hebard Cln.].

Lower California, (G. Eisen), 1 ♂, [Hebard Cln.].

Tepic, Mexico, 1 ♂, [Hebard Cln.].

Federal District, Mexico, (J. R. Inda), 1 ♂, 1 ♀, [U. S. N. M.].

Cuernavaca, Morelos, Mexico, V, 22 to VII, 5, 1905, (W. L. Tower; at light), 9 ♂, 8 ♀, [Am. Mus. Nat. Hist.]; XI, 1898, (O. W. Barrett), 1 ♂, [Hebard Cln.].

Oaxaca, Mexico, VI, 28, (C. C. Deam), 1 ♂, [U. S. N. M.].

Merida, Yucatan, Mexico, (Gaumer), 1 ♂, 1 ♀, [Hebard Cln.].

<sup>24</sup> The Grant's Pass, Oregon, record published by Scudder (Proc. Amer. Acad. Arts and Sci., xxxiii, p. 280, (1898), is probably to be accounted for by an error in labelling, as we have examined the specimens and find the determination to be correct, but the locality is wholly inconsistent with our knowledge of the distribution of the insect.



## II

A SYNOPSIS OF THE SPECIES OF THE GENUS *AMBLY-CORYPHA* FOUND IN AMERICA NORTH OF MEXICO

The present study was prompted by the difficulty encountered by the authors in determining certain individuals of this genus from the eastern and southwestern states. While the desirability of such a study has been apparent to us for some years, it was only in the past few seasons that we were able to take up field work in the regions from which material of this genus was particularly desired. Much still remains to be done in more fully mapping out the range of the different forms and corroborative evidence on certain matters of relationship is still desired, but both of these matters require more information than present material and literature will supply. In consequence we do not present this paper as a monographic treatise, but we do feel that the systematic and general distributional problems have been studied with sufficient thoroughness and with the authority of enough material to be conclusive.

We here record 756 specimens of the genus from the area covered by our studies, these comprising the series in the collections of the Academy of Natural Sciences of Philadelphia, of the junior author, the United States National Museum, the Museum of Comparative Zoology, of Prof. A. P. Morse of Wellesley; Massachusetts, the Pennsylvania State Department of Zoology and the Georgia State Collection. Material bearing on certain points has been loaned by Mr. W. T. Davis of New Brighton, New York, and from the collection of the University of Kansas, while a considerable number of individuals which have previously been recorded by us have also been re-examined. The latter are not generally included in the total of specimens given above and under the specific treatments. We wish to tender our thanks to the authorities in charge of the above mentioned collections and the other fellow entomologists, who so generously have assisted our work by placing their very necessary material before us for study. Of the total number of specimens given above, 285 were

collected by the authors, these representing all but two of the forms.

Within the area covered by the present paper we find the genus *Amblycorypha* represented by one or more species over a considerable portion of the country. The most northern points from which it is known are the White Mountain region, New Hampshire; Montreal, Canada and Minnesota, while it ranges south to the Florida Keys (Big Pine Key), the Gulf Coast and across Texas into Mexico and westward to east central Colorado (Manitou) and north central (Oak Creek Canyon) and southern Arizona. It does not, as far as known, reach the Pacific Coast and apparently is absent from the whole northwestern portion of the United States and western Canada. Over the greater portion of the area covered by the genus it is represented by two species, in other sections by only one species, in some by three and within the boundaries of the state of Texas six forms occur. The latter, of course, do not all occur in any one region in the state, although four forms have been secured in the vicinity of Dallas.

In the present genus, as is occasionally true of certain other genera of this family, we find specimens, occurring with others of normal green coloration, which are of a uniform pinkish color. Several authors have reported such individuals and there has been some speculation regarding the possible cause of the same. We do not intend to go into this question further than to say it appears to be a manifestation of the widespread dichromatic tendency of the group. However, we wish to call attention to the fact that we have examined such pinkish individuals of the following forms of the genus:

*A. oblongifolia*. One ♂. Mosholu, New York.

*A. floridana*. One ♀. San Pablo, Florida.

*A. floridana carinata*. One ♀. Wood's Hole, Massachusetts. One ♂. Absecon, New Jersey. Two ♀. Cedar Springs, New Jersey.

*A. rotundifolia*. One ♀. No locality.

*A. rotundifolia iselyi*. One ♀. Iron Mountain, Missouri.

It is well to bear in mind that the females of this genus show considerable individual variation in the length (actual and relative) and relative depth of the ovipositor; in consequence this appendage is of diagnostic value chiefly through the general curve of the

margins and the extent and character of the armament of the same.

The North American species of the genus *Amblycorypha* fall quite naturally into two groups. Group I contains six forms of varying size, all having an elongate form with markedly elongate tegmina and distinctly projecting wing tips, individually subequal or longitudinal metasternal lobes, and a well marked humeral sinus. Certain features, as the form of the distal margin of the subgenital plate of the male and the character of the ovipositor margins, are of diagnostic value within the group, while the prominence of the lateral angles of the pronotal disk and the extent of the same show within the group the extremes of variation for the genus.

In the assemblage comprising group I certain affinities are evident which a linear arrangement cannot express. On the one hand *oblongifolia* and on the other *uhleri* are very distinct and isolated types, while the *floridana-huasteca-insolita* division is more homogeneous. *Insolita* is a desert representative of the *huasteca* type, while *floridana carinata* is distinctly divergent from *floridana floridana* in the direction of *oblongifolia*, to which, however, it is no way closely related. *Huasteca* and *floridana floridana* show quite a few features in common, but the differences in form of the ovipositor and of the male subgenital plate, as well as in the general shape of the stridulating field of the male tegmina prove their relationship to be by no means as close as would appear at first glance.

#### *Forms of Group I*

Forms of large size, slender build.	{	<i>oblongifolia</i>
		<i>floridana floridana</i>
		<i>floridana carinata</i>
		<i>huasteca</i>
		<i>insolita</i>
Forms of small size, slender build.		<i>uhleri</i>

Group II contains three forms which are all closely related and undoubtedly geographic races of the same species, for which the name of the first known form—*rotundifolia*—must be used. These are all of medium size, moderately or decidedly abbreviate form, with ovate tegmina, slightly or not at all projecting wing tips,

individually transverse metasternal lobes and broad lateral pronotal lobes, which also have the humeral sinus very shallow or subobsolete.

*Forms of Group II*

*rotundifolia rotundifolia*

*rotundifolia parvipennis*

*rotundifolia iselyi*

KEY TO THE FORMS

- A. Humeral sinus of lateral lobes of pronotum well impressed, at least rectangulate. Caudal margin of pronotal disk decidedly arcuate. Individual metasternal lobes not transverse. (Tegmina at least three times as long as greatest width.)
- B. Size large. Caudal femora at most but slightly surpassing apices of tegmina. Ovipositor not deeper distad of the middle than at the base. (Subgenital plate of male with distal margin V-emarginate except in *huasteca*.)
- C. Stridulating field of male tegmina very ample, area of same very much exceeding that of pronotal disk. Ovipositor of female regularly arcuate, margins of the same with decided teeth. (Lateral angles of pronotum decided, continuously indicated. General form of tegmina elongate elliptical, sutural margin distad of anal field regularly and considerably arcuate. Subgenital plate of male with distal margin V-emarginate) ..... ***oblongifolia*** (DeGeer)
- C'. Stridulating field of male tegmina less ample, area of same not greatly exceeding that of pronotal disk. Ovipositor of female not as regularly arcuate as in alternative category, straighter proximad, margins of same with teeth or serrulations.
- D. Subgenital plate of male with distal margin V-emarginate. (Ovipositor elongate or of median length, when margins are serrulate the serrulations are closely placed. Lateral angles of pronotal disk continuously indicated or only so caudad.)
- E. Tegmina less elongate, distal half with margins more or less arcuate convergent and never as regularly narrowing as in opposite category. Caudal width of pronotal disk relatively narrower when compared with length of same. Fastigium distinctly more than twice as wide as proximal antennal joint. Ovipositor elongate, with decided teeth. ***insolita*** new species
- EE. Tegmina considerably elongate, distal half very distinctly and regularly narrowing, margins there straight converging. Caudal width of pronotal disk relatively broader when compared with length of same. Fastigium not more than twice as wide as proximal antennal joint. Ovipositor of medium length, with serrulations.

- F. Disk of pronotum with lateral angles subcarinate and that only caudad, rounded cephalad. Stridulating vein of male tegmina proportionately narrower, sutural margin of tegmina distad of anal field in male and female straighter. Ovipositor shorter; when compared with caudal femora, weaker..... **floridana floridana** R. & H.
- FF. Disk of pronotum with lateral angles more decided and angulate almost or quite continuously. Stridulating vein of male tegmina proportionately broader; sutural margin of tegmina distad of anal field in male and female more arcuate. Ovipositor longer; when compared with caudal femora, heavier..... **floridana carinata** new subspecies
- DD. Subgenital plate of male with distal margin truncate or subtruncate, never V-emarginate. (Ovipositor elongate, serrulations well spaced. Lateral angles of pronotal disk subangulate caudad, broadly rounded cephalad)..... **huasteca** (Saussure)
- BB. Size small. Caudal femora always slightly and generally decidedly surpassing apices of tegmina. Ovipositor deeper distad of the middle than at base. (Subgenital plate of male with distal margin truncate)..... **uhleri** Stål
- AA. Humeral sinus of lateral lobes of pronotum less impressed (and not rectangulate) or subobsolete. Caudal margin of pronotal disk much less arcuate. Individual metasternal lobes transverse. (Tegmina rarely over two and four-fifths times as long as greatest width.)
- B. Form more elongate, slenderer. Wings somewhat surpassing apices of tegmina. Disk of pronotum relatively narrower. Lateral lobes of pronotum relatively narrower dorsad.  
**rotundifolia rotundifolia** (Scudder)
- BB. Form less elongate, more robust. Wings never surpassing apices of tegmina. Disk of pronotum relatively broader. Lateral lobes of pronotum relatively broader dorsad.
- C. Form not decidedly robust. Tegmina more elongate, narrower and not decidedly coriaceous in texture. Dorsum of pronotum not unusually broad. Caudal femora quite elongate, moderately inflated proximad..... **rotundifolia parvipennis** Stål
- CC. Form decidedly robust. Tegmina less elongate, broader and decidedly coriaceous in texture. Dorsum of pronotum unusually broad. Caudal femora not decidedly elongate, proximal inflation relatively weak. **rotundifolia iselyi** Caudell

**Amblycorypha oblongifolia** (DeGeer) (Pl. XI, fig. 32; pl. XII, figs. 41 and 49.)

1773. *Locusta oblongifolia* DeGeer, Mém. Hist. Ins., iii, p. 445, pl. xxxviii, fig. 2. [Pennsylvania.]

1891. *Amblycorypha scudderæ* Bruner, Can. Ent., xxiii, p. 73. [Eastern Nebraska.]

It is quite evident from DeGeer's figure that the specimen in his possession belonged to the present species, the form of the ovi-

positor showing this to be the case. The possession of the type (♀; Omaha, Nebraska; September) of Bruner's *scudderae* enables us to place it as a synonym of *oblongifolia*. This specimen and others from Nebraska are inseparable from Pennsylvania individuals. The characters mentioned by Bruner are valueless, as he in all probability compared his species with specimens of *Amblycorypha floridana floridana* or *f. carinata* and not eastern *oblongifolia*.

From the material before us this species is seen to range from southern New Hampshire (Seabrook), southern Quebec (Montreal), central Iowa (Dallas County) and Albion, Nebraska, south to Plum Point, Maryland, Weldon, North Carolina, New Orleans, Louisiana, and Doucette and San Antonio, Texas, west to Manitou, Colorado. Walker (Can. Ent., xxxvi, pp. 329 and 330) has doubted the correctness of Caulfield's record of this species from as far north as Montreal, Quebec, being convinced that it should refer to *Scudderia pistillata*, but we have examined in the Scudder series in the Museum of Comparative Zoology a male individual of the present species from Montreal collected by Caulfield. Allard's record of *oblongifolia* from Thompson's Mills, Georgia, refers to *Amblycorypha floridana carinata*, the material having been examined by us.

Of the record recently given by Fox<sup>1</sup> for this species all the New Jersey material recorded except that from Canton belongs to the herein described *Amblycorypha floridana carinata*, as examination of the material shows. The Canton record probably relates to the same form but we are unable to verify this by the examination of the material.

*Specimens Examined:* 119; 74 ♂, 45 ♀.

Montreal, Quebec, Canada, (Caulfield), 1 ♂, [M. C. Z.].

Seabrook, New Hampshire, (A. A. Eaton), 1 ♂, [U. S. N. M.].

Woburn, Massachusetts, (J. Shute), 1 ♀, [M. C. Z.].

Chelsea, Massachusetts, X, 7, 1866, 1 ♂, [M. C. Z.].

Wollaston, Massachusetts, IX, 1895, (F. H. Sprague), 1 ♂, 3 ♀, [M. C. Z.].

Vicinity of Boston, Massachusetts, (Scudder), 1 ♂, 1 ♀, [M. C. Z.].

New Haven, Connecticut, (A. E. Verrill), 1 ♀, [U. S. N. M.].

Lake Mahopac, New York, VIII, (T. D. O'Connor), 1 ♂, [Hebard Cln.].

Dunwoodie, New York, VIII, (E. R. Casey), 2 ♂, 1 ♀, [Casey Cln.].

<sup>1</sup> Proc. Acad. Nat. Sci. Phila., 1914, p. 520.



- Mount Vernon, New York, (Miss C. M. Fitch), 1 ♂, [M. C. Z.].  
 Mosholu, New York, IX, 6, 1 ♂, [Hebard Cln.].  
 New York Botanical Garden, Bronx, New York, VIII, 15, 1907, (J. W. Rose), 1 ♀, [U. S. N. M.].  
 Orange, New Jersey, VIII, 1 ♂, [U. S. N. M.].  
 Cornwells, Pennsylvania, X, 1906, (R. & H.), 1 ♀; IX, 7, 1914, (Hebard; on shore of river in vines and bushes), 1 ♂, 1 ♀.  
 Ashbourne, Pennsylvania, IX, 30, 1906, (Bayard Long), 1 ♂, [A. N. S. P.].  
 Chestnut Hill, Pennsylvania, VIII, 15, 1911, IX, 22, 1903, X, 4, 1903, IX, 9, 1914. (H.; in vines and shrubbery), 9 ♂, 2 ♀, [Hebard Cln.].  
 Mount Airy, Pennsylvania, IX, 24, 1914, (H.; in honeysuckle vines), 1 ♀.  
 Tinicum, Pennsylvania, IX, 9, 1904, (H.), 1 ♀.  
 Harrisburg, Pennsylvania, IX, 5 (one specimen), 3 ♂, [Pa. St. Dept. Zool.].  
 Wetzel's Swamp, Harrisburg, Pennsylvania, VIII, 19 and IX, 12, 1 ♂, 1 ♀, [Pa. St. Dept. Zool.].  
 Highspire, Pennsylvania, VII, 28, 2 ♂, [Pa. St. Dept. Zool.].  
 Camphill, Pennsylvania, VIII, 18, 1909, IX, 22, 3 ♂, 2 ♀, [Pa. St. Dept. Zool.].  
 Eberly's Mill, Pennsylvania, VIII, 27, 1909, 2 ♂, [Pa. St. Dept. Zool.].  
 Shiremanstown, Pennsylvania, VIII, 24, 1 ♂, [Pa. St. Dept. Zool.].  
 Orrtanna, Pennsylvania, IX, 4, 1 ♀, [Pa. St. Dept. Zool.].  
 Delaware, 1 ♂, [A. N. S. P.].  
 Millington, Maryland, VIII, 23, 1913, (C. H. Blass), 1 ♂, [Casey Cln.].  
 Blythedale, Maryland, VIII, 29, 1904, (G. M. Greene), 1 ♂, [A. N. S. P.].  
 Chestertown, Maryland, VIII, 10 and 14, 1901, (E. G. Vanatta), 2 ♂.  
 [A. N. S. P.].  
 Plum Point, Maryland, VIII, 25, 1912, 1 ♂, [U. S. N. M.].  
 Plummer's Island, Maryland, IX, 8, 1906, (W. L. McAttee), 1 ♀, [U. S. N. M.].  
 Washington, District of Columbia, VIII, 17 and IX, 23, 1 ♂, 1 ♀, [Hebard Cln.].  
 Virginia, VIII, 17 and X, 15, 1883, 2 ♀, [Hebard Cln.].  
 Virginia shore of Potomac River opposite Plummer's Island, Maryland, X, 6, 1912, (Hood), 1 ♂, [U. S. N. M.].  
 Mountains of Virginia, 1883, (A. Koebele), 1 ♂, [Hebard Cln.].  
 Weldon, North Carolina, VII, 24, 1913, (R. & H.; in low bushes), 1 ♂, 1 ♀.  
 Georgia, 1 ♂, [M. C. Z.].  
 Chillicothe, Ohio, V-VII, 1887, (Denton), 1 ♂, [Morse Cln.].  
 Agricultural College, Michigan, 1 ♂, [Morse Cln.].  
 Evanston, Illinois, (L. N. Johnson), 1 ♀, [U. S. N. M.].  
 Moline, Illinois, (McNeill), 1 ♂, [M. C. Z.].  
 Chattanooga, Tennessee, VIII, 24, 1903, (Morse), 1 ♂, [Morse Cln.].  
 Clarksville, Tennessee, VI, 28, 1912, (S. E. Crumb; feeding on tobacco), 1 ♂, [U. S. N. M.].  
 New Orleans, Louisiana, VI, 18, 1883, (Shufeldt), 1 ♂, 1 ♀, [U. S. N. M.].

Dallas County, Iowa, VIII-IX, 13, (Allen), 13 ♂, 5 ♀, [M. C. Z.].

Omaha, Nebraska, IX, 2 ♀, *type* and *paratype* of *Amblycorypha scudderae*, [Hebard Cln.]; IX, 1 ♀, *paratype* of *A. scudderae*, [M. C. Z.].

West Point, Nebraska, 1 ♀, *paratype* of *Amblycorypha scudderae*, [Hebard Cln.]; 1 ♂, *paratype* of *A. scudderae*, [M. C. Z.].

Weeping Water, Nebraska, IX, 24, 1909, (L. Bruner), 2 ♀, [Hebard Cln.].

Lincoln, Nebraska, VIII, 1, IX, 3, 1909, (C. H. Gable), 1 ♂, 2 ♀, [Hebard Cln.].

Albion, Nebraska, IX, 14, 1909, (L. Bruner), 1 ♀, [Hebard Cln.].

Manitou, Colorado, VIII, 1889, 1 ♀, [Hebard Cln.].

Ashdown, Arkansas, VII, 27, 1905, (Morse), 1 ♀, [Morse Cln.].

Magazine Mountain, Arkansas, elevation 2600 feet, VIII, 29, 1905, (Morse), 1 ♂, [Morse Cln.].

South McAlester, Oklahoma, VIII, 7, 1905, (Morse Cln.), 1 ♂, [Morse Cln.].

Wister, Oklahoma, VII, 4, 1 ♂, [U. S. N. M.].

Dallas, Texas, (Boll), VI, 5 ♂, 2 ♀, [M. C. Z.].

Doucette, Texas, VII, 24, 1912, (H.), 1 ♂, 1 ♀.

San Antonio, Texas, VIII, 15 to 16, 1912, (R. & H.), 1 ♀.

***Amblycorypha floridana floridana*** Rehn and Hebard (Pl. XI, fig. 33; pl. XII, figs. 42 and 50.)

1905. *Amblycorypha floridana* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1905, p. 42, pl. i, fig. 5. [Chokoloskee and Miami (type locality), Florida.]

Our previously expressed belief that this form was but a southern geographic race of *oblongifolia*<sup>2</sup> we are now in a position to disprove, sufficient material being in hand to show the proper relationship of these two and other forms. The specimens from Thomasville, Georgia, then supposed to be intermediate between *floridana* and *oblongifolia* are intermediates, but not between those forms, instead connecting true *floridana* with a northern subspecies of the same stock, which in its turn is perfectly distinct from *oblongifolia*. This northern race we are here describing as *A. floridana carinata*. Both it and *oblongifolia* occur typically at localities where the ranges of the two forms overlap. The differential characters of *A. f. carinata* are given under that race.

The typical race of this species ranges from Big Pine Key and Detroit, southern Florida, as far north typically as Jacksonville, Fernandina and Atlantic Beach, in the same state, westward as far as eastern Texas (Dickinson and Virginia Point), intergrading, in the Atlantic coast region at least, into the northern subspecies (*carinata*) over an extensive area covering from southern Georgia

<sup>2</sup> Proc. Acad. Nat. Sci. Phila., 1907, p. 301.

(Billy's Island, Okeefenoke Swamp, Thomasville and Spring Creek) to eastern South Carolina (Ashley Junction and Yemassee).

*Specimens Examined*: 109; 49 ♂, 59 ♀, 1 ♀ n.

Fernandina, Florida, (W. H. Finn), 1 ♂, [U. S. N. M.].

Atlantic Beach, Florida, VIII, 24 to 25, 1911, (R. & H.), 7 ♂, 7 ♀.

Jacksonville, Florida, VIII, 1885, (Ashmead), 1 ♂, 1 ♀; (Priddey), 2 ♂, [Hebard Cln.].

Hastings, Florida, 1 ♂, [Morse Cln.].

Sanford, Florida, (S. B. Frazer), 2 ♂, 6 ♀, [M. C. Z.].

Enterprise, Florida, V, 21, 1 ♂, 1 ♀, [U. S. N. M.].

Biscayne Bay, Florida, V, 13, 1 ♂, [U. S. N. M.].

Virginia Point, Texas, VII, 21, 1912, (H.; in tall grass on edge of salt marsh), 1 ♀.

Dickinson, Texas, VIII, 20, 1912, (H.; in pine woods), 1 ♂, 1 ♀.

We have previously recorded this form from Miami, Chokoloskee, Homestead, Detroit, Big Pine Key, La Belle, Citrus Center, South Bay of Lake Okeechobee, Gainesville, San Pablo and Pablo Beach, Florida.

Intermediates between *A. f. floridana* and *A. f. carinata*.

Jacksonville, Florida, VIII, 1885, (Ashmead), 1 ♂, [Hebard Cln.].

Billy's Island, Okeefenoke Swamp, Georgia, VI and VII, 1912, IX, 1 to 5, 1913, (J. C. Bradley), 13 ♂, 3 ♀, 1 ♀ n, [Cornell University].

Honey Island, Okeefenoke Swamp, Georgia, VI, 1, 1912, (J. C. Bradley), 4 ♂, [Cornell University].

Thomasville, Georgia,<sup>3</sup> VII, 29, VIII, 4 to 26, 1903, 2 ♂, 2 ♀, [Hebard Cln. and A. N. S. P.].

Spring Creek, Georgia, V, (J. C. Bradley), 1 ♂, 2 ♀, [Ga. St. Cln.].

Isle of Hope, IX, 3, 1911, (R. & H.; in heavy undergrowth in gray-bark pine woods), 1 ♀.

Yemassee, South Carolina, IX, 4, 1911, (R. & H.), 2 ♀.

Ashley Junction, South Carolina, VIII, 15, 1913, (R.; beaten in pine woods), 1 ♀.

***Amblycorypha floridana carinata*** new subspecies (Pl. XI, fig. 34; pl. XII, fig. 51.)

1886. (?) *A[mblycorypha] saussurei* Bruner, Bull. Washb. Coll. Labor. Nat. Hist., i, p. 196.<sup>4</sup>

Differing from *floridana floridana* in the lateral margins of the pronotal disk being more angulate and carinate almost or quite continuously, in the stridulating field of the male tegmina being proportionately broader, in the sutural margin of the tegmina distad of the anal field being more arcuate and in having a longer and heavier ovipositor.

<sup>3</sup> Recorded as *A. oblongifolia*, Proc. Acad. Nat. Sci. Phila., 1904, p. 795.

<sup>4</sup> This name is based on a description of several words, of one character, which would fit the majority of the forms of the genus. In our opinion it is unrecognizable.

*Type*.—♂; Stafford's Forge, Ocean County, New Jersey. July 16, 1911. (Rehn.) [Acad. Nat. Sci. Phila., type no. 5240.]  
*Allotype*.—♀; same data.

*Differential Characters*. Pronotum with the lateral margins of disk regularly indicated, rectangulate in transverse section, never broadly rounded cephalad; disk of pronotum decidedly and regularly expanding caudad (resembling *oblongifolia* in this respect). Stridulating field of male tegmina broader, more expanded, as wide as the caudal margin of the pronotal disk, stridulating vein more transverse; sutural margin distad of anal or stridulating field gently arcuate, distal portion and apex of tegmina appreciably broader than in typical *floridana*. Caudal femora less elongate than in *floridana floridana*. Ovipositor elongate, almost or quite equal to half the length of the caudal femur, less arcuate than in *floridana floridana*, relative depth of ovipositor not as great as in the typical form.

*Measurements (in millimeters)*

	Length of body	Length of pronotum	Greatest (caudal) width of pronotum	Length of tegmen	Length of caudal femur	Length of ovipositor
<i>f. floridana</i>						
♀ Miami, Florida. <i>Type</i> .....	21	7	4.5	32.5	28.5	11
♂ Homestead, Florida.....	25.8	6.7	4.5	35.8	30.4	
♀ Homestead, Florida.....	24.8	7.4	4.9	36.8	32.6	11.4
♂ Atlantic Beach, Florida.....	25	6.6	4.7	34.6	28.7	
♀ Atlantic Beach, Florida.....	28.3	7.2	4.7	32	32	11.5
♀ Atlantic Beach, Florida.....	27.2	7.3	4.9	33.6	32	12.2
Intermediates						
♂ Billy's Island, Georgia.....	22.5	6.2	4.3	33.5	28	
♂ Billy's Island, Georgia.....		7.5	5.4	39	34.4	
♀ Billy's Island, Georgia.....	26.2	7.6	5.2	36.7	33	13.3
♀ Billy's Island, Georgia.....	23.5	7.5	5	36.3	34.8	13.6
♀ Isle of Hope, Georgia.....	26.7	7.1	4.8	36	33.3	13.8
♀ Yemassee, South Carolina.....	25.2	6.8	4.9	32.7	30	13
♀ Yemassee, South Carolina.....	27	7	4.5	31	29.5	12.8
♀ Ashley Junction, S. C.....	27.6	7	4.3	31.6	31.6	12.8
<i>f. carinata</i>						
♂ Silver Lake, Georgia.....	22.9	6.5	4.5	37.5	31.8	
♂ Petersburg, Virginia.....	24	6.3	4.3	33	29	
♀ Petersburg, Virginia.....	27.2	7	5	35.5	32.6	14.5
♀ Washington, D. C.....	22	7	4.8	34	32	14.1
♂ Stafford's Forge, N. J. <i>Type</i> ....	20.8	7	4.9	35.5	29.4	
♀ Stafford's Forge, N. J. <i>Allotype</i>	21	6.9	5	33.2	29.5	14.5
♀ Stafford's Forge, N. J. <i>Paratype</i>	23.4	6.1	4.5	30	26.7	12.3
♀ Atsion, N. J. <i>Paratype</i> .....	25	7.4	4.9	33.6	31.2	13.3

It will be seen from this table that these forms present considerable individual variation, but when the relative proportions are considered the diagnostic size features hold true.

We have indicated as paratypes two males and two females taken at Stafford's Forge, New Jersey, on August 18 and September 5, 1908 (Rehn) and four males and two females taken at Atsion, New Jersey, on August 2, 1901 (Rehn) and July 30, 1911 (R. & H.).

This form ranges typically from north-central Georgia (Silver Lake and Thompson's Mills) and eastern North Carolina (New Berne) northward over southeastern Virginia and southern New Jersey to southern Massachusetts (Woods Hole and Nantucket), westward as far as known only to the fall line in Virginia (Petersburg and vicinity of Washington) and Pennsylvania (Philadelphia), but occurring typical in the Tennessee Valley drainage at Sand Mountain, Georgia, and southward passing into *f. floridana* as stated above. For records belonging to this form but recorded by Fox as *A. oblongifolia* see comments under the latter species.

*Specimens Examined*: 87; 44 ♂, 41 ♀, 2 ♀ n.

Woods Hole, Massachusetts, (Dr. Chas. Schäffer), 1 ♀, [A. N. S. P.]; (Mrs. S. F. Smith), 1 ♀, [M. C. Z.].

Nantucket, Massachusetts, (Scudder), 4 ♂, [M. C. Z.].

Cornwells, Pennsylvania, IX, 7, 1914, (H.; along river in vines and bushes), 1 ♂.

Philadelphia, Pennsylvania, (S. F. Gross), 1 ♂, [Hebard Cln.].

Stafford's Forge, New Jersey, VII, 16, 1911, VIII, 18 and IX, 1908. (R.; in high weeds on moist ground), 3 ♂, 3 ♀, *type*, *allotype* and *paratypes*, [A. N. S. P. and Hebard Cln.].

Atsion, New Jersey, VIII, 2, 1901, (R.), VII, 30, 1911, (R. & H.), 4 ♂, 2 ♀, *Paratypes*, [A. N. S. P. and Hebard Cln.].

Cedar Grove, New Jersey, VIII, 29, 1904, (R.), 1 ♂, [A. N. S. P.].

Tuckerton, New Jersey, VIII, 31, (W. T. Davis), 1 ♀, [Davis Cln.].

Mulliea River meadows near New Gretna, New Jersey, VIII, 24, 1914, (H.; on edge of marsh), 1 ♀.

Reega, New Jersey, VII, 20, VII, 31, VIII, 10, VIII, 16, VIII, 29, 1914, (H.; in pine barrens, one colony in clump of vines and bushes), 11 ♂, 16 ♀, 2 ♀ n.

Absecon, New Jersey, 1 ♂, [A. N. S. P.].

Cedar Springs, New Jersey, VIII, 26, 1914, (H.; in marsh), 4 ♀.

Greenfield, New Jersey, X, 1, 1910, (H. Fox), 2 ♀, [A. N. S. P.].

Sea Isle Junction, New Jersey, (H. Fox), 1 ♀, [A. N. S. P.].

Ocean View, New Jersey, VIII, 15, 1910, (H. Fox), 1 ♀, [A. N. S. P.]; VII, 27, 1914, (H.; on edge of salt marsh), 1 ♂.

Swainton, New Jersey, VIII, 21, 1914, (H.; in marshy meadow), 1 ♂.

Wildwood Junction, New Jersey, VII, 27, VIII, 8, 1914, (H.; huckleberry bushes in oak woods), 4 ♂, 2 ♀.

Dias Creek, New Jersey, VII, 20, 27, 1914, (H.; in deciduous forest on sandy soil), 1 ♂, 2 ♀.

Dorsey, Maryland, VIII, 20, 1914, (Miss R. Jones), 1 ♂, [U. S. N. M.].

Washington, District of Columbia, IX, 1883, 1 ♀, [Hebard Cln.].

Falls Church, Virginia, VIII, 4, (A. N. Caudell), 1 ♂, [U. S. N. M.].

Clarendon, Virginia, VIII, 1913, (H. A. Allard), 1 ♂, [U. S. N. M.].

Petersburg, Virginia, VII, 23, 1913, (R. & H.; in grasses and low bushes in wet place near woods), 1 ♂, 3 ♀.

Bayville, Virginia, VIII, 19, 1908, (R.), 1 ♂, [A. N. S. P.].<sup>5</sup>

Raleigh, North Carolina, VII, 8, 1903, (Morse), 3 ♂, [Morse Cln.].

New Berne, North Carolina, VIII, 24, 1908, (R.), 1 ♂, [A. N. S. P.].<sup>5</sup>

Sand Mountain near Trenton, Georgia, VII, 9, 1905, (Morse), 1 ♂, [Morse Cln.].

Thompson's Mills, Georgia, (H. A. Allard), 1 ♂, [U. S. N. M.].

Silver Lake, Georgia, VIII, 10, 1913, 1 ♂, [Ga. St. Cln.].

**Amblycorypha huasteca** (Saussure) (Pl. XI, fig. 35; pl. XII, figs. 43 and 52.)

1859. *Ph[anacroptera] huasteca* Saussure, Revue et Magasin de Zoologie, 2e ser., xi, p. 205. [Tampico,<sup>6</sup> Mexico.]

1862. *P[hylloptera] caudata* Scudder, Boston Journ. Nat. Hist., vii, p. 445. [Texas.]

We have been able to examine the single type specimen of Scudder's *caudata* and find it to be inseparable from Tampico topotypes of *huasteca*. The type of *caudata* is a large female with a heavy ovipositor, but it is readily matched in the numerous Texan individuals before us. The measurements of the type of *caudata* are as follows: length of body exclusive of ovipositor, 25.5 mm.; length of pronotum, 8; greatest (caudal) width of disk of pronotum, 5; length of tegmen, 39.3; greatest width of tegmen, 10.5; length of caudal femur, 35.5; length of ovipositor, 21.

Examination of the available series of this species shows that the distal margin of the subgenital plate of the male varies somewhat in the exact degree of truncation, this rarely being arcuate emarginato-truncate, the vast majority, however, having the margin straight truncate. In no specimen is there any approach to the v-emargination of the related forms.

The distribution of this species is seen to cover an area extending from northeastern (Fairmount) and central-southern (Barber

<sup>5</sup> Previously recorded by us as *A. oblongifolia*, Proc. Acad. Nat. Sci. Phila., 1910, p. 637.

<sup>6</sup> Vide Brunner, Monogr. der Phaneropt., p. 267.



County and Wichita) Kansas, south to at least Tampico, Mexico, reaching to the Gulf Coast at a number of Texan localities, having been reported from as far east as Louisiana, and extending as far west as Clarendon and Uvalde, Texas.

*Specimens Examined*: 98; 50 ♂, 45 ♀, 1 ♂ n., 2 ♀ n.

Wichita, Kansas, VII, 20, 1 ♀, [U. S. N. M.].

Barber County, Kansas, (F. W. Cragin), 1 ♀, [Hebard Cln.].

Cache, Oklahoma, VIII, 23 to 25, 1905, (Morse), 2 ♂, 4 ♀, [Morse Cln.].

Dallas, Texas, 1 ♀, [U. S. N. M.]; VI, 8, VII, 16, (Boll), 2 ♂, 6 ♀, 1 ♀ n., [M. C. Z.].

Weatherford, Texas, IX, 23, 1912, (R. & H.), 1 ♂.

Wichita Falls, Texas, VIII, 17, 1905, (Morse), 1 ♂, [Morse Cln.].

Clarendon, Texas, VIII, 18, 1905, (Morse), 1 ♂, [Morse Cln.].

Shovel Mount, Texas, VI, 20 to 29, VII, 3 to 21, 1901, (F. W. Schaupp), 8 ♂, 2 ♀, [A. N. S. P.].

Kerrville, Texas, VII, 17 to 18, 1912, (R. & H.; in ground vegetation on summit of hills), 1 ♂, 2 ♀.

Uvalde, Texas, VII, 21 to 22, 1912, (R. & H.), 1 ♂, 1 ♀.

San Antonio, Texas, VI, 16, (M. Newell), 3 ♂, [Hebard Cln.]; VII, 15 to 16, 1912, (R. & H.; in low, heavy and spiny bush), 1 ♂.

Flatonina, Texas, VIII, 19 to 20, 1912, (R. & H.), 5 ♂, 1 ♀.

Dickinson, Galveston County, Texas, VII, 20, 1912, (H.; edge of pine woods), 1 ♂.

La Marque, Galveston County, Texas, VII, 22, 1912, (H.; on wet prairie land), 1 ♂, 2 ♀.

Virginia Point, Galveston County, Texas, VII, 21, 1912, (H.; in tall grasses on edge of salt marsh), 1 ♀.

Galveston, Texas, VII, 19 to 21, 1912, (H.; occasional in low grass and weeds), 3 ♂, 3 ♀.

Columbus, Texas, 1 ♂, [U. S. N. M.].

Victoria, Texas, VII, 26 to 27, 1912, (H.; occasional on broad leaved plants in field), 4 ♂, 5 ♀; VI, (A. N. Caudell), 3 ♂, [U. S. N. M.].

Beeville, Texas, VII, 28, 1912, (H.; in weeds near low bushes), 2 ♂, 6 ♀.

Gregory, Texas, VII, 30, 1912, (H.), 2 ♂, 4 ♀.

Lyford, Texas, VIII, 6 to 7, 1912, (R. & H.), 2 ♂, 1 ♀.

Laguna del Gato, Hidalgo County, Texas, VIII, 6, 1912, (R. & H.), 1 ♂ n.

Brownsville, Texas, VII, 31 to VIII, 5, 1912, (H.), 1 ♂, 2 ♀, 1 ♀ n.; VI, 2, 1904, (H. S. Barber; on cotton), 1 ♂, [U. S. N. M.].

Piper Plantation, Cameron County, Texas, VIII, 3, 1912, (R. & H.), 2 ♂, 1 ♀.

Texas, (A. Agassiz), 1 ♀, [M. C. Z.]. *Type of Phylloptera caudata* Scudder.

Matamoros, Tamaulipas, Mexico, (L. B. Couch), 1 ♀, [M. C. Z.].

Tampico, Tamaulipas, Mexico, XII, 5, 1909, (F. C. Bishopp), 1 ♂, [U. S. N. M.].

**Amblycorypha insolita** new species (Pl. XI, fig. 40; pl. XII, figs. 44 and 54.)

1905. *Amblycorypha huasteca* Rehn (not of Saussure, 1859), Trans. Kansas Acad. Sci., xix, p. 226. [Southern Arizona.]

1907. (?) *Amblycorypha huasteca* Snow (not of Saussure, 1859), Ibid., xx, pt. 2, p. 163. [Oak Creek Canyon, Arizona.]

1909. *Amblycorypha huasteca* Rehn and Hebard (not of Saussure, 1859), Proc. Acad. Nat. Sci. Phila., 1909, p. 168. [Dry Canyon, Sacramento Mountains, New Mexico.]

This striking form is a development of the *huasteca* type, carrying some of the features of that species to a greater extreme and at the same time differing in other purely diagnostic characters. The pronotum has the lateral margins of the disk as broadly rounded cephalad as in *huasteca*, but caudad they are more decided than in that species, the tegmina and wings are much more elongate, appreciably surpassing the tips of the caudal femora, although of the same general form. The lateral lobes of the pronotum have the angles more rounded and the humeral sinus much more decidedly indicated. The stridulating vein of the male tegmina is rather short and very broad and heavy, while the distal margin of the subgenital plate of the same sex is V-emarginate instead of truncate as in *huasteca*. The ovipositor is of the same general form as in *huasteca*, but is relatively deeper with the teeth larger and much more distinct.

*Type*.—♂; Quitman Mountains, El Paso County, Texas. Elevation, 5200 feet. September 14, 1912. (Hebard.) [Hebard Collection.]

*Description of Type*.—Size large; form elongate, moderately compressed; surface of head and pronotum moderately polished. Head with greatest width ventrad of eyes contained one and one-half times in depth of head; occiput rounded, steeply declivent to the nearly vertical fastigium, latter somewhat constricted at the paired ocelli, interfastigial suture sinuate, greatest width of fastigium subequal to that of eye; antennae reaching to tips of wings; eyes moderately prominent, elliptical in outline, faintly pointed dorsad and ventrad. Pronotum deplanate, disk decidedly expanding caudad and with its greatest width contained about one and one-third times in length; lateral margins of disk broadly rounding into lateral lobes cephalad, distinctly angulate caudad; cephalic margin of disk shallowly arcuato-emarginate, caudal margin of disk strongly arcuate, transverse sulcus forming a faint obomegoid figure on the middle of the disk; lateral lobes of pronotum with depth slightly greater than greatest width, cephalic margin faintly arcuato-emarginate, ventro-cephalic angle rounded obtuse-angulate, ventral margin short, nearly straight, oblique, broadly round-

ing into the arcuate caudal margin, which passes rather regularly to the strongly indicated rectangulate humeral sinus. Tegmina surpassing tips of caudal femora by length of pronotum, elongate, lanceolate, greatest width (at proximal third) contained slightly more than four times in length; costal margin arcuate proximad, straight distad, sutural margin distad of stridulating field straight, obliquely converging to the roundly oblique-truncate apex; marginal field broad mesad, humeral trunk sinuate, much thickened and flattened proximad, median vein with its two distal rami reaching oblique portion of apical margin; stridulating field almost twice length of pronotal disk, greatest width about three-fourths of length of pronotal disk, general form similar to that of *huasteca* but more elongate, stridulating vein short, very thick, depressed. Wings surpassing apices of tegmina by about length of pronotal disk. Mesosternal lobes less elongate than in *huasteca*, distal section obliquely truncate mesad; metasternal lobes with proximo-lateral angle more decided and distal margin more arcuate than in *huasteca*. Cerci more elongate and regularly tapering than in *huasteca*, distal section less abruptly denticulate at apex; subgenital plate V-emarginate distad with lateral, articulate, brief and tapering styles. Cephalic femora with at most but three spines on ventro-cephalic margin. Median femora unarmed ventrad. Caudal femora similar in form to those of *huasteca* but with at most but three minute teeth on ventro-internal margin.

*Allotype*.—♀; Montelovez, Coahuila, Mexico. September 20. (E. Palmer.) [Hebard Collection.]

*Description of Allotype*.—When compared with female individuals of *huasteca* that sex of the present species differs in the characters given as diagnostic for the species and in those features possessed by both sexes which are detailed in the description of the male. The ovipositor is slightly more than two-fifths of the tegminal length, quite deep, arcuate, more strongly so distad; teeth on distal half of dorsal margin and distal fourth of ventral margin, decided, well spaced. Subgenital plate trigonal.

*Color Notes*.—General color course green to biscay green, occasionally paling to light chalcedony yellow on the abdomen (type) and always becoming lettuce green to light bice green on the head and pronotum, the exposed portion of the wings and distal extremity of the tegmina rarely (one specimen) washed with old gold. Eyes of the general color, lineate with yellowish to hazel. Pronotum with lateral margins of disk more or less completely lineate, distad with raw sienna, faintly bordered laterad, dorsad of humeral sinus, by clove brown, cephalad with ochraceous buff. Tegmina with stridulating field charaiois to cartridge-buff, with an oblique irregular maculation extending from base of field to distal section of free margin and a weak edging of same margin proximad

clove brown, stridulating vein occasionally raw sienna; discoidal field of tegmina with numerous small to medium-sized scattered ocelliform false fungous areas of clove brownish, sutural margin of same rarely weakly washed with same color. Tibiae more or less pinkish on dorsal surfaces, as strong as pompeian red on cephalic and median tibiae and flesh pink on caudal tibiae.

These notes have been made from only the individuals which show the best preserved coloration and have not been immersed in liquid preservative. Certain specimens of the latter character are of an entirely buffy color.

*Measurements (in millimeters)*

	♂ Quitman Mountains, Texas <i>Type</i>	♂ Dry Can- yon, New Mexico <i>Paratype</i>	♂ Comacho, Zacatecas, Mexico <i>Paratype</i>	♀ Southern Arizona	♀ Montelovez, Coahuila, Mexico <i>Allotype</i>
Length of body.....	27	24.5	19	20.2	24
Length of pronotum .....	6.4	8	6.1	7.2	7.6
Greatest dorsal width (caudad) of pronotal disk.....	5.1	5.2	4.6	5.2	5.6
Length of tegmen.....	42.3	42.7	37.7	39	41.6
Greatest width of tegmen.	10.3	10.4	8.8	10.3	11.4
Length of caudal femur...	29.8	31.7	27.7	30.5	31.5
Length of ovipositor.....				16.5	16.3

*Distribution.*—As far as known this most interesting species occurs only in the Sonoran desert areas of the southwestern United States and northern Mexico, extending from western Texas (Chisos Mountains, Sierra Blanca and Quitman Mountains) west to Southern Arizona (exact locality unknown), south to at least the state of Coahuila and the northern part of the state of Zacatecas (Comacho), Mexico and northward to southern New Mexico (Dry Canyon). It is practically certain that the material recorded by Snow from Oak Creek Canyon, central Arizona, belongs to this form, but all efforts to locate the specimens have failed.

In addition to the type and allotype we have examined a paratype male taken in Dry Canyon, Sacramento Mountains, Otero County, New Mexico, 5200 feet elevation, VII, 13, 1907 (R. & H.), another paratype of the same sex from Comacho, Zacatecas,

Mexico, taken by Bruner, XI, 1887, in the Hebard Collection, a paratypic male and female bearing the same data as the allotype, in the collection of the Museum of Comparative Zoology and one paratypic male from the Chisos Mountains, Texas, VI, 10 to 12, 1908, in the United States National Museum. A female from the collection of the University of Kansas bearing the locality "Southern Arizona," another of the same sex labelled "Chihuahua, Mexico," in the collection of the Museum of Comparative Zoology and an immature female taken at Sierra Blanca, El Paso County, Texas, 4524 feet elevation, IX, 13 to 14, 1912 (R. & H.), have also been examined. Several of these specimens have been immersed in alcohol and their coloration either entirely or in large part destroyed in consequence. The female nymph is in the instar preceding maturity and the characters of the species are fairly well indicated. The Comacho and Chisos Mountains males are appreciably smaller than the type, while the Montelovez male is similar to the latter size. The females show considerable individual variation in bulk, the southern Arizona representative being appreciably smaller than the others of that sex, which among themselves show less decided variation.

On the Quitman Mountains the species was taken in grasses near small oaks and junipers, the Sierra Blanca nymph was beaten from black brush (*Flourensia cernua*) and in Dry Canyon the insect was beaten from a small green tree growing in the piñon and juniper zone.

*Specimens Examined:* 10; 5 ♂, 4 ♀, 1 ♀ n.

Chisos Mountains, Brewster County, Texas, VI, 10 to 12, 1908, (Mitchell and Cushman), 1 ♂, [U. S. N. M.], *Paratype*.

Sierra Blanca, El Paso County, Texas, 4524 feet elevation, IX, 13 to 14, 1912, (R. & H.), 1 ♀ n.

Quitman Mountains, El Paso County, Texas, 5200 feet elevation, IX, 14, 1912, (H.), 1 ♂, *Type*.

Dry Canyon, Sacramento Mountains, Otero County, New Mexico, 5200 feet elevation, VII, 13, 1907, (R. & H.), 1 ♂, *Paratype*.

Southern Arizona, VIII, 1902, (F. H. Snow), 1 ♀, [Univ. of Kansas].

Montelovez, Coahuila, Mexico, IX, 20, (E. Palmer), 1 ♂, 2 ♀, [M. C. Z.]. *Allotype and paratypes*.

Chihuahua, Mexico, 1 ♀, [M. C. Z.].

Comacho, Zacatecas, Mexico, XI, 1887, (Bruner), 1 ♂, [Hebard Cln.], *Paratype*.

**Amblycorypha uhleri** Stål (Pl. XI, fig. 36; pl. XII, figs. 45 and 53.)

1876. *A[mblycorypha] uhleri* Stål, Bihang till K. Svenska Vet.-Akad. Handl., iv, no. 5, p. 57. [Texas.]

This species is very plastic, varying considerably in size, both individually and geographically, and appreciably in the proportionate width of the tegmina and in the length and relative depth of the ovipositor. The area in which the species reaches greatest size is southern Georgia and northern Florida, but even in the material from that region there is much individual variation. In consequence of the lack of a sufficient representation of material from the coast region of Alabama, Mississippi, Louisiana and the Mississippi valley it seems best to give only a few measurements of average pairs and the extreme individuals of the species seen. The depauperate condition of the Uvalde minimum female is remarkable, the other specimens from that locality being distinctly above the average in size.

The range of this species extends from southern New Jersey, south to southern Florida, in the east extending as high as 1600 to 1800 feet elevation (Murphy, North Carolina, and Currahee Mountain, Georgia), west to eastern Oklahoma and west-central Texas (Uvalde), ranging north in the Mississippi valley region as far as Minnesota and central Indiana and Illinois, and south in Texas as far as Victoria. In Arkansas the species ranges as high as 2600 feet (Rich Mountain) and has been captured as high as 1700 feet in Texas (Kerrville).

	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of ovipositor
♂ Parkdale, New Jersey..	4.8	24.2	7	21	
♂ Weldon, N. C.....	5.3	27.2	8.5	24.2	
♂ Yemassee, S. C.....	5.5	26.2	8	24.7	
♂ Toccoa, Georgia.....	5	25	7.1	22	
♂ Spring Creek, Georgia..	6	29.8	9	26.7	
♂ Jacksonville, Florida...	5.6	26	7.9	22.7	
♂ Homestead, Florida....	5.8	26.5	8.1	26	
♂ Doucette, Texas.....	5	22.9	6.8	23.7	
♂ Rosenberg, Texas.....	6	26.5	7.2	24.6	
♂ Uvalde, Texas.....	6.2	26.5	7.6	27.8	



	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of ovipositor
♀ Atsion, New Jersey....	5.7	21.7	6.5	23.2	8.1
♀ Weldon, N. C.....	5.7	21.5	6.5	23.5	7.7
♀ Yemassee, S. C.....	5.6	22.2	6.7	23.5	8
♀ Toccoa, Georgia.....	5.3	21.2	6.5	22.7	7.7
♀ Spring Creek, Georgia..	5.9	28	8.6	27	10
♀ Jacksonville, Florida...	6.4	29	8.9	27.2	9.7
♀ Homestead, Florida....	7	26.3	7.5	28.5	9.1
♀ Doucette, Texas.....	5.3	25.7	7.3	25.5	7.8
♀ Rosenberg, Texas.....	6	24.5	6.7	26	7.4
♀ Uvalde, Texas.....	6.5	25.7	7	27.8	7.8
♀ Uvalde, Texas.....	5.2	19.3	5.3	21	6.2

*Specimens Examined:* 215; 127 ♂, 85 ♀, 2 ♂ n., 1 ♀ n.

Parkdale, New Jersey, VII, 30, 1911, (R. & H.; undergrowth in pine barrens), 1 ♂.

Atsion, New Jersey, VII, 30, 1911, (R. & H.; undergrowth in pine barrens), X, 8, 1903, (H.), 1 ♂, 1 ♀.

Reega, New Jersey, VIII, 10 (nymphs), VIII, 29, 1914, (H.; undergrowth in pine woods), 2 ♂, 2 ♀ n.

Sea Isle Junction, New Jersey, IX, 5, 1909, (Fox; field), 2 ♂, [A. N. S. P.].

Delaware, 1 ♂, [A. N. S. P.].

Chestertown, Maryland, VIII, 12, 1901, VIII, 21, 1899, (E. G. Vanatta), 2 ♂, [A. N. S. P.].

Washington, District of Columbia, VIII, 1883, X, 3, (Pergande), 2 ♂, [Hebard Cln.]; VIII, 1909, 1 ♂, [U. S. N. M.].

Analostan Island, District of Columbia, IX, 6, 1912, 1 ♂, [U. S. N. M.].

Clarendon, Virginia, VIII, 1913, (Allard), 1 ♂, [U. S. N. M.].

Fredericksburg, Virginia, VII, 20, 1913, (R. & H.; in meadow land near woods), 1 ♂.

Murphy, North Carolina, VIII, 22, 1903, (Morse), 1 ♀, [Morse Cln.].

Weldon, North Carolina, VII, 24, 1913, (R. & H.; in low heavy bushes near forest), 3 ♂, 1 ♀.

Goldsboro, North Carolina, VII, 25, 1913, (R. & H.; in green grasses and weeds in damp spots in short-leaf pine woods), 2 ♂, 3 ♀.

Lake Waccamaw, North Carolina, IX, 8, 1911, (R. & H.), 1 ♂.

Charlotte, North Carolina, late VII, 1907, (F. Sherman), 1 ♀, [U. S. N. M.].

Columbia, South Carolina, VII, 28, 1913, (R. & H.), 1 ♂.

Denmark, South Carolina, VIII, 15, 1903, (Morse), 3 ♀, [Morse Cln.].

Port Royal, South Carolina, (Fowler), 1 ♂, [M. C. Z.].

Yemassee, South Carolina, IX, 4, 1911, (R. & H.; in undergrowth in pine woods), 8 ♂, 5 ♀.

Sand Mountain, near Trenton, Georgia, VIII, 25, 1903, (Morse), 1 ♂, 1 ♀, [Morse Cln.].

Currahee Mountain, Georgia, 1700 feet elevation, VIII, 5, 1913, (H.), 1 ♂, 1 ♀ n.

Toccoa, Georgia, VIII, 4 to 5, 1913, (H.; in grasses, vines and oak sprouts in clearings), 2 ♂, 4 ♀.

Jasper, Georgia, 1550 feet elevation, VIII, 5, 1913, (R.; beaten from scrub), 1 ♂.

Thompson's Mills, Georgia, X, 1909, (Allard), 1 ♂, 1 ♀, [U. S. N. M.].

Buckhead, Georgia, VIII, 2, 1913, (R. & H.; in weeds and vines in low spot in oak and pine woods), 3 ♂.

Stone Mountain, Georgia, IX, 12, 1913, 1 ♂, [Ga. State Cln.].

Augusta, Georgia, VII, 29, 1913, (R. & H.; in sandy scrub oak area), 2 ♀.

Macon, Georgia, VII, 30 to 31, 1913, (R. & H.; in undergrowth of short-leaf pine woods), 2 ♂.

Savannah, Georgia, VIII, 14, 1903, (Morse), 1 ♂, [Morse Cln.].

Isle of Hope, Georgia, IX, 3, 1911, (R. & H.; in undergrowth of gray-bark pine woods), 2 ♂.

Sandfly, Georgia, IX, 3, 1911, (R. & H.; in undergrowth of gray-bark pine woods), 1 ♀.

Brunswick, Georgia, VIII, 30, 1911, (H.; taken under green bushes in wet place), 1 ♀.

Albany, Georgia, VIII, 1, 1913, (R. & H.; in undergrowth in pine woods), 4 ♂, 1 ♀.

Spring Creek, Georgia, VII, 1912, VIII, 26 to 28, (J. C. Bradley), 3 ♂, 7 ♀, [Ga. State Cln.].

Bainbridge, Georgia, 1 ♀. [Ga. State Cln.].

Jacksonville, Florida, VIII, 1885, (Ashmead), 3 ♀, (Hebard Cln.); VIII, 25, 1911, (R. & H.), 1 ♂, 2 ♀.

Live Oak, Florida, VIII, 10, 1903, (Morse), 2 ♀, [Morse Cln.].

Crescent City, Florida, VII, 7, (on orange trees), 1 ♂, [U. S. N. M.].

Sanford, Florida, (G. B. Frazer), 1 ♂, [M. C. Z.].

Fort Barrancas, Florida, VIII, 3, 1903, (Morse), 1 ♀, [Morse Cln.].

Wyandotte, Indiana, VIII, 1905, (A. N. Caudell), 1 ♂, [U. S. N. M.].

Kentucky, (Garman), 1 ♂, [M. C. Z.].

Lookout Mountain, Tennessee, VIII, 23, 1903, (Morse), 1 ♂, [Morse Cln.].

Clarksville, Tennessee, X, 3, 1912, (S. E. Crumb; feeding on cotton), 1 ♀, [U. S. N. M.].

Hattiesburg, Mississippi, VII, 17, 1905, (Morse), 1 ♂, 1 ♀, [Morse Cln.].

Nugent, Mississippi, VII, 20, 1905, (Morse), 1 ♀, [Morse Cln.].

Bushberg, Missouri, IX, 14, 1877, 1 ♀, [U. S. N. M.].

St. Louis, Missouri, (Dr. George Engelmann), 1 ♀, [M. C. Z.].

Winslow, Arkansas, IX, 3, 1905, (Morse), 2 ♂, [Morse Cln.].

Magazine Mountain, Arkansas, 2000 feet elevation, VIII, 29, 1905, (Morse), 2 ♀, [Morse Cln.].

Rich Mountain Station, Arkansas, VIII, 2, 1905, (Morse), 1 ♂, [Morse Cln.].

- Sunmit of Rich Mountain, Arkansas, 2600 feet, VIII, 1, 1905, (Morse), 1 ♂, [Morse Cln.].
- Mena, Arkansas, VII, 30, 1905, (Morse), 4 ♂, 1 ♀, [Morse Cln.].
- Eagleton, Arkansas, VIII, 3, 1905, (Morse), 2 ♂, [Morse Cln.].
- De Queen, Arkansas, VII, 29, 1905, (Morse), 1 ♂, [Morse Cln.].
- Ashdown, Arkansas, VII, 27, 1905, (Morse), 1 ♀, [Morse Cln.].
- South McAlester, Oklahoma, VIII, 7, 1905, (Morse), 1 ♂, [Morse Cln.].
- Howe, Oklahoma, VIII, 4, 1905, (Morse), 1 ♂, 2 ♀, [Morse Cln.].
- Caddo, Oklahoma, VIII, 9, 1905, (Morse), 6 ♂, 4 ♀, [Morse Cln.].
- Plano, Texas, VII, (E. S. Tucker), 1 ♂, 1 ♀, [U. S. N. M.].
- Pittsburg, Texas, VII, 19, 1907, (F. C. Bishopp), 1 ♂, [U. S. N. M.].
- Dallas, Texas, 1 ♂, [U. S. N. M.]; (Boll), 9 ♂, 5 ♀, [M. C. Z.].
- Denison, Texas, VIII, 12, 1905, (Morse), 1 ♀, [Morse Cln.].
- Doucette, Texas, VII, 24, 1912, (H.; common in open in low bushes), 5 ♂, 2 ♀.
- Webster, Texas, VII, 19, 1912, (H.; occasional in clumps of weeds), 5 ♂, 1 ♀.
- Rosenberg, Texas, VII, 25 to 26, 1912, (H.; very common in park-like country), 14 ♂, 8 ♀.
- Columbus, Texas, VI, 6, 1879, 1 ♀, [U. S. N. M.].
- Lavaca County, Texas, VI, 21, 1 ♂, 1 ♀, [U. S. N. M.].
- Victoria, Texas, VI, (A. N. Caudell), 4 ♂, [U. S. N. M.]; VII, (J. D. Mitchell), 1 ♀, [U. S. N. M.].
- Granjeno, Texas, V, 24, 1895, 1 ♀, [U. S. N. M.].
- Kerrville, Texas, 1525 feet elevation, VIII, 17 to 18, 1912, (R. & H.; beaten from vines in river bottom), 1 ♀.
- Uvalde, Texas, VIII, 21 to 22, 1912, (R. & H.), 2 ♂, 3 ♀.

We have previously recorded this species from Lucaston and Sea Isle Junction, New Jersey, Raleigh and Winter Park, North Carolina, Tallapoosa, Toccoa and Thomasville, Georgia and Gainesville and Homestead, Florida.

**Amblycorypha rotundifolia rotundifolia** (Scudder) (Pl. xi, fig. 37; pl. xii, figs. 46 and 55.)

1862. *P[hylloptera] rotundifolia* Scudder, Boston Journ. Nat. Hist., vii, p. 445. [Massachusetts; Vermont; Connecticut; Rhode Island; Illinois.]

A careful search through the material of this species in the collection of the Museum of Comparative Zoology has failed to bring to light any of the original specimens on which the species was founded. The Rhode Island specimen was in the Harris Collection according to Scudder and in consequence it was in all probability destroyed with the other Orthoptera belonging to that series. The other specimens were probably given away or exchanged when individuals of the species with more exact data were obtained. The identification of the form is, however, so

easy that the examination of the type material was only desired to fill out the record of types studied.

This form is typical over southern New England, the eastern mountain, Piedmont and northern Coastal Plain regions, extending westward over the central Mississippi Valley region, also occurring typical on the summit of Rich Mountain in the Ozark Mountains of western Arkansas. The most northern definite locality from which the form has been recorded is the White Mountain region, while the most western in the Mississippi region is Moline, Illinois. The most southern localities from which we have seen typical *rotundifolia rotundifolia* are Spartanburg, South Carolina; Toecoa, Tuckoluge Creek and Blue Ridge, Georgia, and the summit of Rich Mountain, Arkansas. In northwestern and central Georgia and in the southern portion of the Coastal Plain we find the specimens of this species having an abbreviation of the wings, accompanied by a reduction of the humeral sinus and broadening of the dorsal section of the lateral lobes of the pronotum, thus approximating *rotundifolia parvipennis*. We have examined individuals exhibiting this intermediate condition from Winter Park, North Carolina; Macon, Warm Springs and Sand Mountain, Georgia, and Valley Head and Cheawha Mountain, Alabama.

Measurements (in millimeters) of average individuals of *rotundifolia rotundifolia*, *rotundifolia iselyi* and *rotundifolia parvipennis*, with certain measurements of the last mentioned two from other authors, are as follows:

	Length of pronotum	Greatest caudal width of pronotum	Greatest width of dorsal section of lateral lobes of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of ovipositor
<i>A. rotundifolia rotundifolia</i>							
♂ Parkdale, New Jersey.....	5.5	3.7	4	25.2	8.9	24	
♂ Beatty, Westmoreland County, Pennsylvania...	5.3	3.9	4.2	25.7	9.2	23.2	
♀ Orange, Virginia.....	5.6	4	4	25.5	8.5	22.5	
♂ Mt. Pisgah, N. C.....	5.5	3.9	4.2	24	8.2	21.8	
♂ Currahee Mountain, Ga...	5.9	4	4.6	27	9	25.5	
♂ Franklin County, Ind.....	5.2	3.7	3.9	24.5	9	23	

	Length of pronotum	Greatest caudal width of pronotum	Greatest width of dorsal section of lateral lobes of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of ovipositor
<i>A. rotundifolia rotundifolia</i> *							
♀ Lyme, Connecticut .....	6.5	4.2	5	27	9.5	26	10.3
♀ Stafford's Forge, N. J. ....	6	4	4.6	24.3	8.4	24.8	10.8
♀ Beatty, Westmoreland County, Pennsylvania ..	6.2	4	5	24.3	8	24.6	9.3
♀ Orange, Virginia .....	6	4	4.6	26	9	25.7	10
♀ Jones' Knob, N. C. ....	6.4	4.2	5.1	24.6	8.6	23.5	10
♀ Spartanburg, S. C. ....	6	3.8	4.5	24	7.7	24.8	8.8
♀ Toccoa, Georgia .....	5.8	4	5	23.7	8.1	25	9.6
♀ Fulton County, Indiana ..	6	4.1	5	24.5	9.4	25.8	9.8
<i>A. rotundifolia rotundifolia</i> x							
<i>A. r. parvipennis</i>							
♀ Winter Park, N. C. ....	7.4	4.8	5.8	28	9.6	28	10.7
♀ Macon, Georgia .....	6.3	4	5	24.8	8	25	9
♀ Warm Springs, Georgia ....	6.2	4	4.8	25.2	8.5	25	9.5
<i>A. rotundifolia parvipennis</i>							
♂ Texas .....	(Ex Stål)			24	7	26	
♂ Texas .....	(Ex Brunner)			23	8	28	
♂ Dallas, Texas .....		4.8	6.2	26.4	8.5	29.1	
♀ Texas .....	(Ex Stål)			26	8	28	15
♀ Texas .....	(Ex Brunner)			24	8	29	15
♀ Dallas, Texas .....		4.9		23.4	8		13.9
♀ Lavaca County, Texas ....	9	5.7	7.8	29.6	9.8	32.4	12.5
♀ Rich Mountain Sta., Ark.	7.2	5.1	6.1	28.1	9.3	29	10
<i>A. rotundifolia iselyi</i>							
♂ Little Rock, Iowa .....	6.5	4.4	5.2	22.7	8.2		
♂ Ames, Iowa .....	6.7	4.5	5.5	22.5	9	23.2	
♂ Wichita, Kan. <i>Paratype</i> ..	6.5	5	5.3	22.7	8.7	25.3	
♀ Ames, Iowa .....	6.6	5	5.5	21.2	8	23.2	10.3
♀ Iron Mountain, Missouri ..	6.9	4.7	5.5	23.5	8.5	25.4	11.5
♀ Wichita, Kan. (Ex Caudell) <i>Type</i> .....	8	5		25	9	26	10 <sup>7</sup>

*Specimens Examined:* 102; 57 ♂, 45 ♀, 1 ♂ n., 1 ♀ n.

Milton, Massachusetts, VIII, 28, 1897, (F. H. Sprague), 4 ♂, 1 ♀ n.; X, 8, 1897, (F. H. Sprague), 1 ♀, [M. C. Z.].

<sup>7</sup> Measured to ventro-proximal point, as in our other measured specimens, the ovipositor of this individual shows 11.8 mm.

Wollaston, Massachusetts, VIII-IX, 1895, (F. H. Sprague), 3 ♀, [M. C. Z.].

Walpole, Massachusetts, VIII, 1 and 2, 1897, (F. H. Sprague), 3 ♂, [M. C. Z.].

Cambridge, Massachusetts, 1 ♂, [M. C. Z.].

Lyne, Connecticut, VIII, 21, 1910, (B. H. Walden), 2 ♀, [Hebard Cln.].

Ithaca, New York, VIII, 5-22, 1890-1891, 3 ♂, 1 ♀, [Morse Cln.].

Marlboro, New York, IX, 1 ♂, [Bklyn. Inst. A. & S.].

West Creek, New Jersey, VIII, 28, 1914, (R.; in undergrowth in oak woods), 3 ♀.

Parkdale, New Jersey, VII, 30, 1911, (R. & H.; in oak scrub), 2 ♂; VII, 30, 1911, (A. N. Caudell), 3 ♂, [U. S. N. M.].

Reega, New Jersey, VII, 31, VIII, 16, VIII, 29, 1914, (H.; under pines and oaks, males stridulating at night), 2 ♂, 3 ♀.

Wildwood Junction, New Jersey, VIII, 27, VIII, 8, 1914, (H.; in huckleberry bushes, etc., in oak woods), 1 ♂, 2 ♀.

White Mills, Wayne County, Pennsylvania, VIII, 7 to 9, 2 ♂, [Bklyn. Inst. A. & S.].

Rockville, Pennsylvania, VII, 22 to 29, VIII, 7 to 18, 2 ♂, 2 ♀, [Pa. St. Dept. Zool.].

Beatty, Westmoreland County, Pennsylvania, (Brugger), 1 ♂, 1 ♀, [A. N. S. P.].

Plummer's Island, Maryland, IX, 2, (A. N. Caudell), 1 ♂, 1 ♀, [U. S. N. M.].

Glen Echo, Maryland, VII, 10, 1914, (H.; undergrowth in openings along edge of pine woods), 9 ♂, 1 ♀.

Arlington, Virginia, VII, 9, 1914, (H.), 8 ♂, 7 ♀, 1 ♂ n.

Glencarlyn, Virginia, VIII, 12, 1 ♀, [U. S. N. M.].

Peaks of Otter, Virginia, (Wm. Palmer), 1 ♀, [U. S. N. M.].

Cranberry, North Carolina, 1896, 1 ♀, [U. S. N. M.].

Jones' Knob, near Balsam, North Carolina, VIII, 19, 1903, (Morse), 1 ♂, [Morse Cln.].

Governor's Island, North Carolina, VIII, 20, 1903, (Morse), 1 ♂, [Morse Cln.].

Topton, North Carolina, 3000 to 4000 feet, VII, 21, 1903, (Morse), 1 ♀, [Morse Cln.].

Spartanburg, South Carolina, VIII, 6, 1913, (H.), 1 ♀.

Tuckoluge Creek, Rabun County, Georgia, VII, 1910, (Davis), 3 ♂.

Toccoa, Georgia, 1094 feet elevation, VIII, 4 to 5, 1913, (H.; in scant undergrowth of huckleberry bushes in dense forest of pine saplings), 1 ♀.

Currahee Mountain, Georgia, 1700 feet elevation, VIII, 5, 1913, (H.), 2 ♂.

Blue Ridge, Georgia, VII, 25, 1903, (Morse), 1 ♂, [Morse Cln.].

Fulton County, Indiana, VII, 31, 1903, (W. S. Blatchley), 1 ♀, [A. N. S. P.].

Franklin County, Indiana, (W. S. Blatchley), 1 ♂, [A. N. S. P.].

Crawford County, Indiana, VII, 10, 1899, (W. S. Blatchley), 1 ♀, [U. S. N. M.].



Michigan, 1 ♀, [M. C. Z.].

Green River, Illinois, VIII, 20, 1 ♀, [M. C. Z.].

Moline, Illinois, VIII, 4, 1 ♂, [M. C. Z.].

Bee Spring, Kentucky, VI, 14 to 15, 1874, (F. G. Sanborn), 1 ♀, [M. C. Z.].

Summit of Rich Mountain, Arkansas, 2600 feet, VIII, 1, 1905, (Morse), 2 ♂, [Morse Cln.].

Intermediate between *A. r. rotundifolia* and *A. r. parvipennis*.

Winter Park, North Carolina, IX, 7, 1911, (R.; in wire grass in pine woods), 1 ♀.

Sand Mountain, Georgia, VII, 8, 1903, (Morse), 1 ♀, [Morse Cln.].

Macon, Georgia, VII, 30 to 31, 1913, (R. & H.), 1 ♀.

Warm Springs, Georgia, 850 to 1200 feet elevation, VIII, 9 to 10, 1913, (R.; in pine and oak woods), 1 ♀.

Valley Head, Lookout Mountain, Alabama, VII, 11, 1905, (Morse), 1 ♀, [Morse Cln.].

Chehaw Mountain, Alabama, 2600 feet, VII, 13, 1905, (Morse), 2 ♂, 2 ♀, [Morse Cln.].

We have also examined and reported *A. rotundifolia rotundifolia* from Jones' Knob, 6000 feet elevation, and Mt. Pisgah, 5740 feet elevation, North Carolina.

**Amblycorypha rotundifolia parvipennis** Stål (Pl. xi, fig. 38; pl. xii, figs. 47 and 56.)

1876. *Amblycorypha parvipennis* Stål, Bihang till K. Svenska Vet.-Akad. Handl., iv, no. 5, p. 58. [Texas.]

The present form is clearly a derivative of the *rotundifolia* stock inhabiting the southern prairie region, extending eastward and intergrading with *r. rotundifolia* in the southeastern states, for information regarding which see above under *A. r. rotundifolia*. Intergradation with *A. r. iselyi* has been assumed on the relatively minor importance of the characters separating the two forms, and more collecting in the proper regions will in all probability establish this affinity as clearly as our present material demonstrates that existing between *A. r. rotundifolia* and *A. r. parvipennis*.

The heavier form, abbreviate wings and robust pronotum, which latter has the humeral sinus much reduced and the lateral lobes broader dorsad, are the chief characters which separate *A. r. parvipennis* and *A. r. iselyi* from *A. r. rotundifolia*. In all the specimens seen of typical *parvipennis* and *iselyi* the wings are never evident when the tegmina are closed.

The two related forms (i.e. *r. parvipennis* and *r. iselyi*) can be best separated by the slenderer general form and more elongate

and narrower, as well as less coriaceous, tegmina of *parvipennis*, the generally narrower dorsum of the pronotum and the more elongate, yet relatively more inflated, caudal femora of the same race. There is some individual variation in the length and robustness of the styles of the male subgenital plate and also of the ovipositor in both forms.

The distribution of this race covers an area extending from the lower country of western Arkansas (Rich Mountain Station) and south central Oklahoma (Ardmore), south to at least Lavaca County, Texas. We have no information as to the eastern and western limits of typical *parvipennis*, but as shown under *r. rotundifolia* intermediates showing a great tendency toward *r. parvipennis* occur in the southeastern states.

*Specimens Examined*: 7; 4 ♂, 2 ♀, 1 ♀ n.

Rich Mountain Station, Arkansas, VIII, 2, 1905, (Morse), 1 ♀, [Morse Cln.].

Ardmore, Oklahoma, VI, 1, (C. R. Jones), 1 ♂, [U. S. N. M.].

Texas, (Belfrage), 2 ♂, [M. C. Z.].

Dallas, Texas, (Boll), 1 ♂ n., [M. C. Z.]; 1 ♂, [U. S. N. M.].

Lavaca County, Texas, VI, 21, 1 ♀, [U. S. N. M.].

***Amblycorypha rotundifolia iselyi*** Caudell (Pl. XI, fig. 39; pl. XII, figs. 48 and 57.)

1904. *Amblycorypha iselyi* Caudell, Journ. New York Entom. Soc., xiii, p. 50. [Wichita, Kansas.]

The relationship of *r. iselyi* to *r. parvipennis* and *r. rotundifolia* is very evident to anyone examining the series of specimens of the three forms studied by us. As stated above the direct relationship of *r. iselyi* and *r. parvipennis* is close, although we have no positive proof of the assumed intergradation. We have given above under *r. parvipennis* the important differential characters separating this form from its relatives.

The range of *rotundifolia iselyi* extends from northwestern (Little Rock) and central (Dallas County) Iowa, south to eastern Missouri (Iron Mountain) and south-central (Wichita) Kansas.

*Specimens Examined*: 7; 4 ♂, 3 ♀.

Little Rock, Iowa, VII, 16, 1893, (E. D. Ball), 1 ♂, [A. N. S. P.].

Ames, Iowa, (E. D. Ball), 1 ♂, 2 ♀, [A. N. S. P. and Hebard Cln.].

Dallas County, Iowa, VIII, 20 to 23, (Allen), 1 ♂, [M. C. Z.].

Wichita, Kansas, VII, 29, 1904, (F. B. Isely), 1 ♂, *Paratype*, [Hebard Cln.].

Iron Mountain, Missouri, 1 ♀, [Hebard Cln.].

## EXPLANATION OF PLATES

## PLATE IX

- FIG. 1.—*Scudderia furcata furcata*. Disto-dorsal abdominal segment of male from dorsum. Shasta County, California. ( $\times 12$ )
- " 2.—*Scudderia furcata furcata*. Disto-dorsal abdominal segment of male from dorsum. Lake Mahopac, New York. ( $\times 12$ )
- " 3.—*Scudderia cuneata*. Disto-dorsal abdominal segment of male from dorsum. Florence, South Carolina. ( $\times 12$ )
- " 4.—*Scudderia mexicana*. Disto-dorsal abdominal segment of male from dorsum. Baboquivari Mountains, Arizona. ( $\times 12$ )
- " 5.—*Scudderia texensis*. Disto-dorsal abdominal segment of male

## CORRECTION

These figures are all one-half the dimensions cited except Plate IX, figure 13 which is one and one-half times.

- " 11.—*Scudderia hemidactyla*. Lateral outline of type. Caparo, Trinidad. ( $\times 2$ )
- " 12.—*Scudderia curvicauda laticauda*. Lateral outline of female. Billy's Island, Georgia. ( $\times 2$ )
- " 13.—*Scudderia strigata*. Outline of tegmen of male. Jacksonville, Florida. ( $\times 2$ )
- " 14.—*Scudderia septentrionalis*. Disto-dorsal abdominal segment of male from dorsum. West Point, Nebraska. ( $\times 12$ )
- " 15.—*Scudderia hemidactyla*. Disto-dorsal abdominal segment of male from dorsum. Caparo, Trinidad. Type. ( $\times 12$ )
- " 16.—*Scudderia hemidactyla*. Disto-dorsal abdominal segment of male in lateral outline. Caparo, Trinidad. Type. ( $\times 12$ )
- " 17.—*Scudderia hemidactyla*. Disto-dorsal abdominal segment of male from venter. Caparo, Trinidad. Type. ( $\times 12$ )

## PLATE X

Care should be taken in comparing material with these figures, as the plane of the basal axis is not the same in all cases.

FIG. 18.—*Scudderia strigata*. Outline of ovipositor. Jacksonville, Florida. (Greatly enlarged.)

“ 19.—*Scudderia furcata furcata*. Outline of ovipositor. Saunders-town, Rhode Island. (Greatly enlarged.)

“ 20.—*Scudderia furcata furcifera*. Outline of ovipositor. Chisos Mountains, Texas. (Greatly enlarged.)

“ 21.—*Scudderia cuneata*. Outline of ovipositor. Miami, Florida. (Greatly enlarged.)

“ 22.—*Scudderia hemidactyla*. Outline of ovipositor. *Allotype*. Caparo, Trinidad. (Greatly enlarged.)

“ 23.—*Scudderia texensis*. Outline of ovipositor. La Marque, Texas. (Greatly enlarged.)

“ 24.—*Scudderia pistillata*. Outline of ovipositor. Great Cranberry Island, Maine. (Greatly enlarged.)

“ 25.—*Scudderia curvicauda laticauda*. Outline of ovipositor. Billy's Island, Georgia. (Greatly enlarged.)

“ 26.—*Scudderia curvicauda curvicauda*. Outline of ovipositor. Rockville, Pennsylvania. (Greatly enlarged.)

“ 27.—*Scudderia curvicauda borealis*. Outline of ovipositor. Aweme, Manitoba. *Type*. (Greatly enlarged.)

“ 28.—*Scudderia mexicana*. Outline of ovipositor. Huachuca Mountains, Arizona. (Greatly enlarged.)

“ 29.—*Scudderia septentrionalis*. Outline of ovipositor. No locality. (Greatly enlarged.)

## PLATE XI

FIG. 30.—*Scudderia pistillata*. Outline of male cercus. Pequaming, Michigan. (Greatly enlarged.)

“ 31.—*Scudderia septentrionalis*. Outline of male cercus. West Point, Nebraska. (Greatly enlarged.)

“ 32.—*Amblycorypha oblongifolia*. Lateral outline of pronotum, tegmen and exposed wing. Male. Chestnut Hill, Pennsylvania. (× 2)

“ 33.—*Amblycorypha floridana floridana*. Lateral outline of pronotum, tegmen and exposed wing. Male. Homestead, Florida. (× 2)

“ 34.—*Amblycorypha floridana carinata*. Lateral outline of pronotum, tegmen and exposed wing. Male. *Type*. Stafford's Forge, New Jersey. (× 2)

- FIG. 35.—*Amblycorypha huasteca*. Lateral outline of pronotum, tegmen and exposed wing. Male. Flatonia, Texas. ( $\times 2$ )
- " 36.—*Amblycorypha uhleri*. Lateral outline of pronotum, tegmen and exposed wing. Webster, Texas. ( $\times 3$ )
- " 37.—*Amblycorypha rotundifolia rotundifolia*. Lateral outline of pronotum, tegmen and exposed wing. Male. Parkdale, New Jersey. ( $\times 3$ )
- " 38.—*Amblycorypha rotundifolia parvipennis*. Lateral outline of pronotum and tegmen. Male. Dallas, Texas. ( $\times 3$ )
- " 39.—*Amblycorypha rotundifolia iselyi*. Lateral outline of pronotum and tegmen. Male. Paratype. Wichita, Kansas. ( $\times 3$ )
- " 40.—*Amblycorypha insolita*. Lateral outline of type. Quitman Mountains, Texas. ( $\times 2$ )

## PLATE XII

- FIG. 41.—*Amblycorypha oblongifolia*. Stridulating field of male. Chestnut Hill, Pennsylvania. ( $\times 4$ )
- " 42.—*Amblycorypha floridana floridana*. Stridulating field of male. Homestead, Florida. ( $\times 4$ )
- " 43.—*Amblycorypha huasteca*. Stridulating field of male. Flatonia, Texas. ( $\times 4$ )
- " 44.—*Amblycorypha insolita*. Stridulating field of male. Type. Quitman Mountains, Texas. ( $\times 4$ )
- " 45.—*Amblycorypha uhleri*. Stridulating field of male. Webster, Texas. ( $\times 4$ )
- " 46.—*Amblycorypha rotundifolia rotundifolia*. Stridulating field of male. Parkdale, New Jersey. ( $\times 4$ )
- " 47.—*Amblycorypha rotundifolia parvipennis*. Stridulating field of male. Dallas, Texas. ( $\times 4$ )
- " 48.—*Amblycorypha rotundifolia iselyi*. Stridulating field of male. Paratype. Wichita, Kansas. ( $\times 4$ )
- " 49.—*Amblycorypha oblongifolia*. Outline of ovipositor. Cornwells, Pennsylvania. ( $\times 4$ )
- " 50.—*Amblycorypha floridana floridana*. Outline of ovipositor. Type. Miami, Florida. ( $\times 4$ )
- " 51.—*Amblycorypha floridana carinata*. Outline of ovipositor. Paratype. Stafford's Forge, New Jersey. ( $\times 4$ )
- " 52.—*Amblycorypha huasteca*. Outline of ovipositor. Flatonia, Texas. ( $\times 4$ )
- " 53.—*Amblycorypha uhleri*. Outline of ovipositor. Rosenberg, Texas. ( $\times 4$ )
- " 54.—*Amblycorypha insolita*. Outline of ovipositor. Southern Arizona. ( $\times 4$ )

- FIG. 55.—*Amblycorypha rotundifolia rotundifolia*. Outline of ovipositor.  
Lyme, Connecticut. ( $\times 4$ )
- “ 56.—*Amblycorypha rotundifolia parvipennis*. Outline of ovipositor.  
Lavaca County, Texas. ( $\times 4$ )
- “ 57.—*Amblycorypha rotundifolia iselyi*. Outline of ovipositor. Ames,  
Iowa. ( $\times 4$ )